ATARI
GAMES

CYBERBALL
2072

Universal Kit
Installation Instructions

For technical assistance:

If reading through this manual does not lead to solving your game maintenance or repair problem, call TELE-HELP® at one of these Atari Games Customer Service offices:

UNITED STATES

Atari Games Corporation
California Customer Service Office
737 Sycamore Drive
P.O. Box 361110
Milpitas, CA 95035
Fax (408) 434-3945
Telex 5101007850
Ⓒ **(408) 434-3950**

(Monday–Friday, 7:30 a.m.–4:00 p.m. Pacific time)

EUROPE

Atari Games Ireland Limited
European Customer Service Office
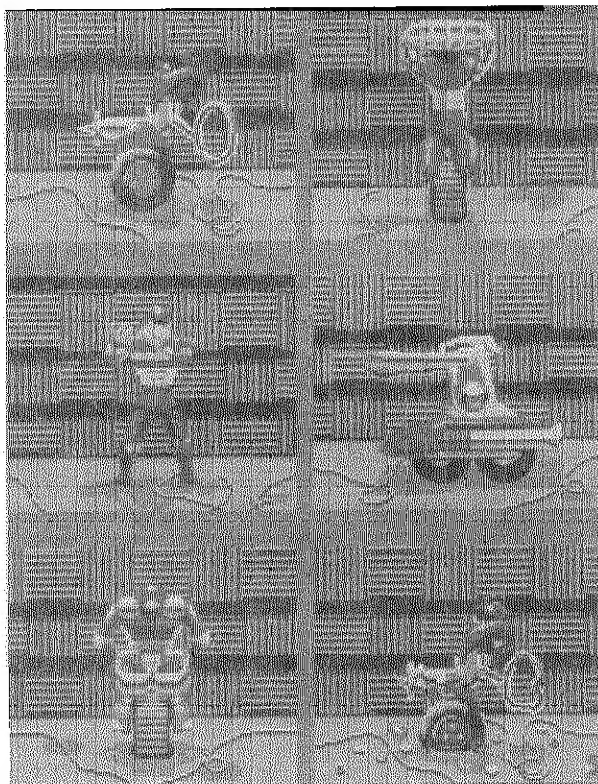Tipperary Town, Ireland
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ATARI
GAMES

Cyberball® 2072

U N I V E R S A L   K I T

Installation Instructions

For horizontal displays.
Includes:
- *JAMMA compatible*
  PC boards
- *Harness*
- *Joysticks*
- *Decals*

Notice Regarding Non-Atari* Parts

WARNING

Use of non-Atari parts or modifications of any Atari game circuitry may adversely affect the safety of your game, and may cause injury to you and your players.

You may void the game warranty (printed on the inside back cover of this manual) if you do any of the following:

* Substitute non-Atari parts in the game.
* Modify or alter any circuits in the game by using kits or parts *not* supplied by Atari Games Corporation.

NOTE

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area or modification to this equipment is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference. If you suspect interference from an Atari game at your location, check the following:

- All ground wires in the game are properly connected as shown in the game wiring diagram.

* The power cord is properly plugged into a grounded three-wire outlet.

* On games provided with an Electromagnetic Interference (EMI) ground cage, be sure that the game printed-circuit boards (PCBs) are properly installed on the EMI ground cage and that the end board is securely installed with **all** screws in place and tightened.

If you are still unable to solve the interference problem, please contact Customer Service at Atari Games Corporation. See the inside front cover of this manual for service in your area.

Contents

1 Installation

2 Self-Test

3 Maintenance and Troubleshooting

4 Illustrated Parts Lists

See the list of illustrations that follows.

5 Schematics

See the list of illustrations that follows.

Statistics Sheet

Illustrations

Tables

Safety Summary

The following safety precautions apply to all game operators and service personnel. Specific warnings and cautions will be found in this manual whenever they apply.

WARNING

Properly Ground the Game. Players may receive an electrical shock if this game is not properly grounded! To avoid electrical shock, do not plug in the game until it has been inspected and properly grounded. This game should only be plugged into a grounded three-wire outlet. If you have only a two wire outlet, we recommend you hire a licensed electrician to install a three-wire grounded outlet. If the control panel is not properly grounded, players may receive an electrical shock! After servicing any part on the control panel, check that the grounding wire is firmly secured to the inside of the control panel. After you have checked this, lock up the game.

AC Power Connection. Before you plug in the game, be sure that the game's power supply can accept the AC line voltage in your location. The line voltage requirements are listed in the first chapter of this manual.

Disconnect Power During Repairs. To avoid electrical shock, disconnect the game from the AC power before removing or repairing any part of the game. If you remove or repair the video display, be very careful to avoid electrical shock. High voltages continue to exist even after power is disconnected in the display circuitry and the cathode-ray tube (CRT). Do not touch the internal parts of the display with your hands or with metal objects! Always discharge the high voltage from the CRT before servicing it. Do this after you disconnect it from the power source. First, attach one end of a large, well-insulated, 18-gauge jumper wire to ground. Then momentarily touch the free end of the grounded jumper wire to the CRT anode by sliding the wire under the anode cap. Wait two minutes and do this again.

Use Only Atari Parts. To maintain the safety of your Atari game, use only Atari parts when you repair it. Using non-Atari parts or modifying the game circuitry may be dangerous, and could injure you and your players.

Handle the CRT With Care. If you drop the CRT and it breaks, it may implode! Shattered glass from the implosion can fly six feet or more.

Use the Proper Fuses. To avoid electrical shock, use replacement fuses which are specified in the parts list for this game. Replacement fuses must match those replaced in fuse type, voltage rating, and current rating. In addition, the fuse cover must be in place during game operation.

CAUTION

Properly Attach All Connectors. Make sure that the connectors on each printed circuit board (PCB) are properly plugged in. The connectors are keyed to fit only one way. If they do not slip on easily, do not force them. If you reverse a connector, it may damage your game and void your warranty.

Ensure the Proper AC Line Frequency. Video games manufactured for operation on 60 Hz line power (used in the United States) must not be operated in countries with 50 Hz line power (used in Europe). If a 60 Hz machine operates on 50 Hz line power, the fluorescent line ballast transformer will overheat and cause a potential fire hazard. Check the product identification label on your machine for the line frequency required.

ABOUT NOTES, CAUTIONS, AND WARNINGS

In Atari publications, notes, cautions and warnings have the following meaning:

WARNING — Players and/or technicians can be killed or injured if instructions are not followed.

CAUTION — Equipment and/or parts can be damaged or destroyed if instructions are not followed. You will void the warranty on Atari printed-circuit boards, parts thereon, and video displays if equipment or parts are damaged or destroyed due to failure of following instructions.

NOTE — A highlighted piece of information.

Chapter 1

Installation

How to Use This Manual

This manual provides information for installing, testing, and troubleshooting the Cyberball® 2072 Universal kit.

The manual is divided into the following chapters:

- Chapter 1 describes the installation procedure and the Cyberball 2072 game play.

- Chapter 2 contains self-test procedures.

- Chapter 3 contains troubleshooting procedures.

- Chapter 4 contains illustrated parts lists.

- Chapter 5 contains the schematics for the game PCB and JSA II Audio PCB.

Also bound into Chapter 1 of this manual is the template for drilling the holes for the Cyberball 2072 control panel.
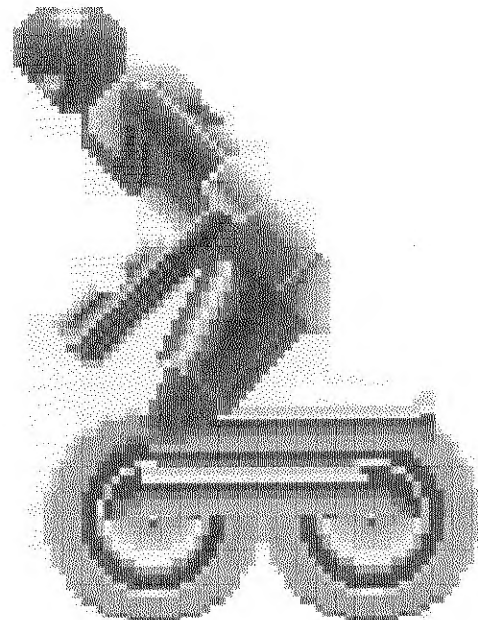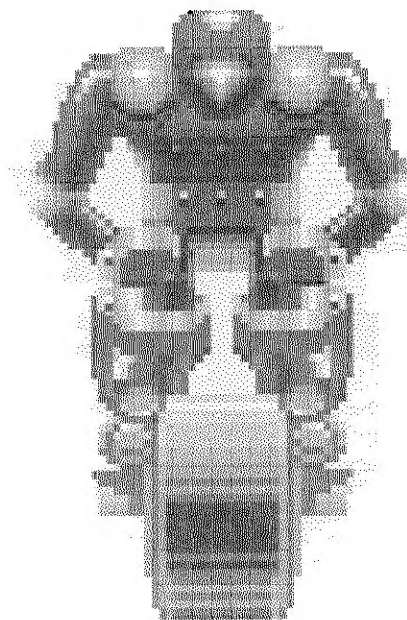
Equipment Requirements

See Table 1-1 for the equipment required in the cabinet in which you are installing the Cyberball 2072 kit.

Table 1-1 Equipment Requirements for the Cyberball 2072 Kit

Equipment	Specification
Video Display	■ Color RGB monitor
	■ Separate positive horizontal and vertical sync or negative composite sync
	■ Horizontal mounting
	■ Horizontal frequency 15.750 KHz
	■ Vertical frequency 60 Hz
	■ Recommended size: 19 inch
	■ Video input 1V to 3V peak-to-peak positive polarity
Control Panel	Metal preferred
Space Below Control Panel	At least 4 1/2 inches deep
Speaker	8 Ohms 10 Watts
Coin Mechanism	+5 VDC or +12 VDC
Power Cord	Three-conductor with ground
Power Supply	+5 VDC ± 0.25V @ 7.0 amps
	+12 VDC ± 0.5V @ 1.0 amp
	-5 VDC ± 0.5V @ 1.0 amps

Tools Required

■ Two C-clamps
■ Drill with 1/4 inch drill bit, a 1 3/16-inch hole cutter (or 1 3/16-inch chassis punch), and a 1 3/4-inch hole cutter
■ Phillips screwdriver
■ Flat-blade screwdriver
■ Socket set
■ Wire cutters and strippers
■ Straight edge
■ Squeegee
■ X-ACTO™ knife
■ Fast-ons (if you are installing a new JAMMA harness)

Preparing the Existing Game for Conversion

1. Turn off power to the game.
2. Remove the old game PCB(s). Remove the game harness if it is not Japan Amusement Machinery Manufacturers Association (JAMMA)-compatible.
3. Remove all the control panel decals, labels, and controls.
4. Remove any side decals from the cabinet. If your cabinet has wood grain or laminate sides, remove the old graphics and adhesive. If the sides are damaged, repair them before putting on the new decals.
5. Remove and clean the video display plexiglass, display bezel, attraction shield, and marquee, if any.
6. Paint the cabinet, if required.
7. Wipe down and vacuum the cabinet as necessary, including the face of the display.

Inspecting the Kit

Check to see that you have all the parts listed in the kit parts list in Table 1-2. If any part is missing or damaged, please contact your distributor and with the Cyberball 2072 kit serial number, part number and description of any missing or damaged parts, and date received.

Table 1-2 Kit Contents Checklist

Received?	Item
❑	Cyberball 2072 Board Set
❑	JAMMA Harness Assy
❑	Display Bezel
❑	Attraction Film w/ Graphics
❑	Attraction Shield
❑	Universal Control Panel Decal
❑	Control Functions Labels
❑	Control Panel Cover
❑	Side Panel Decal
❑	Left Coinage Decal
❑	Right Coinage Decal
❑	Product ID Label
❑	FCC Label
❑	Two 8-Position Microswitch Joysticks
❑	Two Black Button Assemblies
❑	Two White Button Assemblies
❑	Four Snap-Action Switches
❑	Four Nylon Standoffs
❑	Four Type AB #6 Screws
❑	Twelve Black #10 Carriage Bolts
❑	Twelve #10 Poly Locks

Installing the Kit Parts

Display Bezel

Find the display bezel (part no. 047401-01). Measure the size of the existing display bezel and cut the new display bezel to size, if necessary. (See Figure 1-1.)

Product ID and FCC Label

Place the product ID label (part no. 038158-01) and FCC label (part no. 039450-01) on the back of the cabinet.

Side Decals

Find the side panel decals (part no. 047171-01). Wet the left and right side panels of the cabinet with slightly soapy water. Then position the decals as desired. Remove any wrinkles in the artwork using a squeegee. Allow the sides to dry.

Attraction Shield

Find the attraction shield (part no. 047205-01) and the attraction film (part no. 047402-01). Using the existing shield as a template, cut the shield and film to size, if necessary. Install them on the cabinet as shown in Figure 1-1.
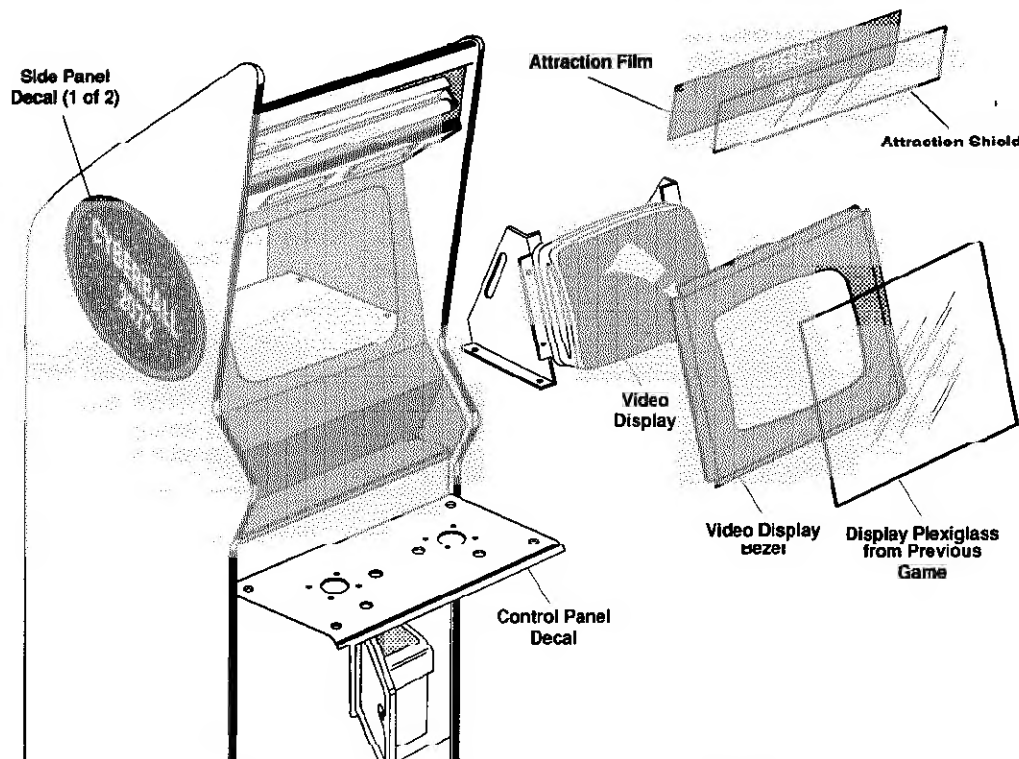
Figure 1-1 Assembling the Cyberball 2072 Kit Parts

Control Panel

Unpack the Cyberball 2072 control panel cover (part no. 047209-01) and control panel decal (part no. 047403-01). Measure your control panel to find out what size the decal and cover should be. Cut the control panel decal and cover to fit.

Drilling Holes in the Control Panel Cover

1. Clamp the control panel cover to the control panel.

2. Drill four corner holes through the control panel and the control panel cover. Use a 1/4-inch drill bit.

3. Install four carriage bolts and locknuts through the holes to hold the cover and the control panel together.

4. Cut the control panel template out of the manual (see page 1-9). Cut the template down the middle to separate the two parts, one for each set of player controls.

5. Tape the templates next to each other on the control panel cover. See Figure 1-2 for the controls arrangement.

6. Cut the holes in the cover and panel as shown by the templates using a 1 3/16-inch hole cutter for the button holes and a 1 3/4-inch hole cutter for the joystick knob holes. Use a 1/4-inch drill bit to drill the mounting holes for the joysticks.

Installing the Control Panel Decal and Labels

1. Disassemble the control panel and the control panel cover. Deburr the holes in the cover and the panel.

2. Install the control panel decal on the control panel. Using a sharp knife, cut out the holes for the controls in the decal.

3. Put the control labels on the control panel. (See Figure 1-2.)

4. Install the cover on the control panel with four carriage bolts and locknuts.

Installing the Controls

1. Install the black player control buttons on the left player and the white player control buttons on the right. (See Figure 1-2.)

NOTE

After the buttons are tightened on the control panel, you can put a small amount of clear RTV silicon on two or three areas of the locknut to keep the buttons from being unscrewed from the top.

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2. Mount each joystick assembly on the control panel with four carriage bolts and locknuts. Install the joysticks so the Atari Games logos are upright. See Figure 1-2.
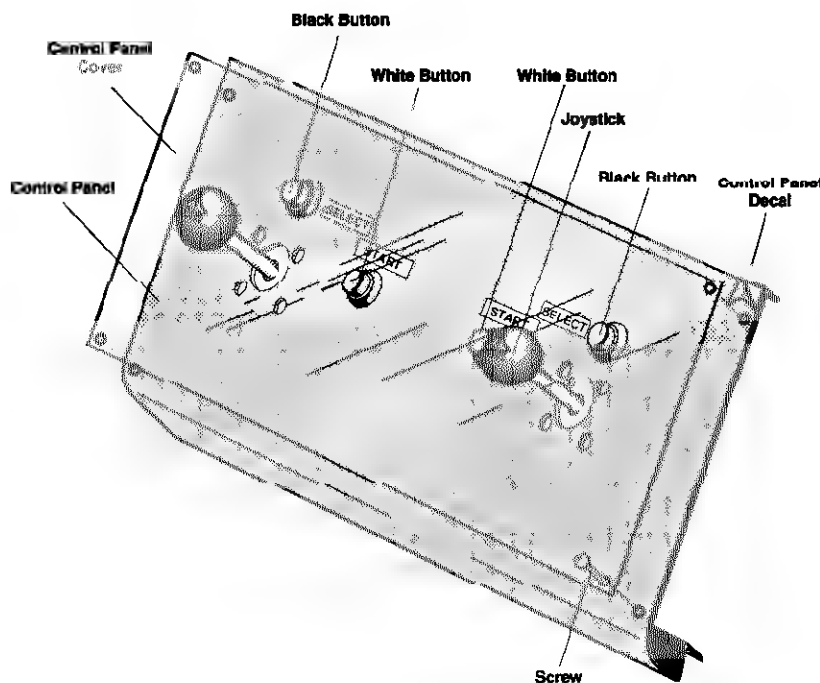

Figure 1-2 Assembling the Cyberball 2072 Kit Control Panel and Cover

3. Install the joystick harnesses on each joystick.

General Harness Installation

1. If your game does not already have a JAMMA harness, find the JAMMA harness (part no. A046501 01) in the kit and install it.

2. Using Table 1-3, *JAMMA Pin and Wire Connections,* for wiring information, connect the JAMMA harness to existing component harnessing. You can do this using crimp splices or by butt soldering.

WARNING

Do not simply tie the wires together If you do, you could cause intermittent problems, loose connections, oxidation, or even a fire.

Connecting Power Wires

1. Connect the wires on the JAMMA harness to the wires for the power supply. You need +5V, -5V, and +12V for the Cyberball 2072 kit. This kit may not require all of the voltages used in your original game. Tie off any unused wires on the power supply

2. You will notice that there is more than one wire for each voltage. You must use more than one wire, as called out in the footnotes of Table 1-3. Using more than one wire for each voltage ensures that you do not overload the edge connector and cause it to burn.

Connecting Video Display Wires

Connect the wires designated for the RED, GREEN, and BLUE video guns along with the sync and ground wires.

NOTE

The JAMMA harness provides only negative composite sync. However if your video display requires separate positive sync, see Chapter 3 for alternative wiring.

Connecting Coin Door Wires

1. Connect the wires on the JAMMA harness to the coin switches and meter.

2. Connect one side of the door lamps to one of the BK/W wires. Connect the other side of the door lamps to the R wire supplying +5V to the joysticks.

NOTE

Do not use -5V for the coin door lamps. -5V is required for audio.

(Some games have separate power supply outputs for the coin door lamps. If you choose to use these outputs, make sure you connect both sides of the lamps to the terminals on the power supply.)

3. Be sure to clean the coin mechanisms; however, *do not lubricate the coin mechanisms.*

Connecting the Control Wires

Connect the joystick wires to the JAMMA harness according to the information in Table 1-3. The test screen is in the game self-test, explained in Chapter 2.

Grounding the Cabinet

WARNING

Consult a licensed electrician if you're not clear about the following grounding procedure. An improperly connected power cord is hazardous and can cause fatal injuries to players and/or technicians.

Find the ground lead (green) of the 115V input power line. Connect this lead in daisy-chain fashion to a bare metal part of the coin door, control panel, video display, and power supply. *This is a safety requirement for the players' protection.* This AC ground must be of #18 AWG wire or larger.

Checking the Cabinet Systems

Before plugging in the game PCB, turn on the power to the game, and check +5 Volts on pins 3, 4, C, and D of the JAMMA connector; +12 Volts on pins F and 6; and -5 Volts on pins E and 5. Check that the video display and the attraction lamp have power..

Now turn off the power to the game.

The above voltages should be measured, using a voltmeter, with respect to pin 1 (BN wire) and ground.

WARNING

Always power down before installing or removing the game or JSA board. Components on these PCBs are very sensitive to power spikes. Removal or installation while the power is on can damage your game board.

Table 1-3 JAMMA Pin and Wire Connections

Solder Side				Component Side		
Signal	Note (See Below)	Wire Color	Pin	Wire Color	Note (See Below)	Signal
+5V RTN	1	BN	A 1	BN	1	+5V RTN
+12V RTN	1	BN	B 2	BN	1	RTN
+5V	2	R	C 3	R	2	+5V
+5V	2	R/W	D 4	R/W	2	+5V
–5V	3	OR	E 5	OR	3	–5V
+12V	4	Y	F 6	Y	4	+12V
Key			H 7			Key
COIN CTR 2	5	V/W	J 8	BU/W	5	COIN CTR 1
			K 9			NOT USED
SPKR–	TP	W	L 10	BN	TP	SPKR +
AUDIO GND			M 11			NOT USED
GREEN	6	GN	N 12	R	6	RED
COMPSYNC	6	BN	P 13	BU	6	BLUE
NOT USED			R 14	BK	6	VIDEO RTN
			S 15	W	7	SELF-TEST
Right Player						**Left Player**
COIN 2	8	BK/OR	T 16	BK/Y	8	COIN 1
NOT USED			U 17	W/BK	NC	SPARE
UP	9	Y/BN	V 18	W/BN	9	UP
DOWN 2	9	Y/R	W 19	W/R	9	DOWN 1
LEFT 2	9	Y/OR	X 20	W/OR	9	LEFT
RIGHT 2	9	Y/W	Y 21	W/Y	9	RIGHT 1
START/SELECT 2	9	Y/GN	Z 22	W/GN	9	START/SELECT 1
NOT USED			a 23			NOT USED
NOT USED			b 24			NOT USED
NOT USED			c 25			NOT USED
NOT USED			d 26			NOT USED
SW GND	12	BK/W	e 27	BK/W	12	SW GND
SW GND	12	BK/W	f 28	BK/W	12	SW GND

Notes

NC means no connection required for Cyberball 2072. TP means twisted pair.

1. Connect four of the large BN wires to the 5V RTN (GND) terminal on the power supply unless the power supply has a 12V RTN. If there is a 12V RTN, connect one of the wires to the 12V RTN (GND) terminal.

2. Three of the R wires go to the +5V terminal on the power supply. If the power supply has a +SENSE terminal, connect one of these three wires to the +SENSE instead of the +5V. The fourth wire goes to the red wires on the joysticks.

3. Connect both wires to the 5V terminal of the power supply.

4. Connect both wires to the +12V terminal of the power supply. (If your coin counter(s) require(s) 12V, you can use one of these two wires for the + side of the coin counter(s).)

5. Connect to the negative side of the coin counter(s).If your counter(s) require 5V, you will need to splice into the red wire that brings +5V to the joysticks. See Note 2, above. *Note: Do not use 24V counters.*

6. Attach to the video display.

7. Use this wire if you want an external self-test switch. However, the Cyberball 2072 kit already has one self-test switch on the JSA Audio PCB. If you connect an external self-test switch, first make sure the switch on the PCB is switched off. Then connect this wire to the N.O. terminal on the external self-test switch. Connect the common terminal of the self-test switch to one of the BK/W wires (GND).

8. Connect to the N.O. terminals of the two coin switches. Connect the common terminals of the coin switches to one of the BK/W wires.

9. Connect to the N.O. terminals of the start/select switches. Connect the common terminals of the switches to one of the BK/W wires.

10. Connect to the gray wire on the joystick.

11. Connect to the white wire on the joystick.

12. Connect one wire to the negative sense terminal of the power supply (if it exists). Connect the second wire to the common terminals of the coin switches. Connect the third wire to the common terminals of the control switches. Connect the fourth wire to the black wires on the joystick harness.

Installing the Cyberball 2072 Printed-Circuit Boards

1. Find the Cyberball 2072 PCB Assembly (part no. A047295-01) and install it inside the cabinet. Use the nylon standoffs in the kit.

2. Make sure the interconnect harnesses are installed correctly and are tight. See Figure 1-3.

3. Connect the JAMMA connector to the PCB.

4. Apply power to the game. Check that the game PCB functions. If a video picture is not present, refer to Chapter 3.

Testing After Power-Up

Use the self-test to check the operation of the game. Refer to Chapter 2 for information about the self-tests.

We suggest that you perform a self-test when you first set up the game, each time you collect the money, or when you suspect game failure.

Setting the Coin and Game Options

The Cyberball 2072 coin and game options are set during the self-test. See Chapter 2 for information about the option settings.

Game Play

This section of the manual describes the theme of the Cyberball 2072 game and the game play features.

Introduction

Welcome to Cyberball 2072, celebrating 50 years of explosive entertainment! The new game includes: approximately 150 new plays (nearly 250 total), new selectable teams, unique robot players, a special challenge "Game Breakers" feature, a beat-the-coach feature, a player upgrade and team improvement (a real coin-grabber), and a selectable simplified game for beginner players.

In Cyberball 2072, each player uses an 8-way joystick and button to call the plays and control the action. Before field action starts, the player chooses the plays with the controls. During the play, the joystick controls the robot's direction on the field. On the offense, the button controls the quarterback's passes and laterals. On the defense, the button gives a defensive player Turbo Defense, a quick burst of speed.

Cyberball 2072 can be played by one or two players. For variety, players are given a choice of two types of games. "Regulation Cyberball 2072" is a challenge to play against one of six computer-controlled teams.

"Game Breakers" tests players' ability to make the big play under pressure situations.

A new simplified game mode has been added for beginner players. It eliminates the need for many decisions that require advanced skills, such as team selection, coach selection (vs. computer), team funds, and all player purchases and upgrades. At the same time, both offensive and defensive play selection decisions have been streamlined to allow more time for on-field action.

Game Play

Cyberball 2072 rules are similar to football rules, but players must keep the ball from exploding. If the ball explodes, possession turns over. The ball status display shows whether the ball is cool, warm, hot, or critical. A critical ball will explode if it is not defused. The player can defuse the ball by moving it over the 50-yard line or goal line.

On the line of scrimmage, the robot that the player controls is a slightly different color from the others. Each player controls one robot on his team. By pressing a player button before the ball is hiked, the player can control a different robot.

New Players: For even more fun, two new players have been added to the game. The Power Back has the option to pass or hand-off the ball again if so desired. This player will keep the defense on its toes! The other new player is the Outside Linebacker. With the ability for great pass coverage, look out for interceptions!

Beat-the-Coach: To simulate the excitement of playing against a live opponent, a beat-the-coach feature has been added. In advanced level games, players are asked which coach they want to compete against. Each coach has a win/loss record displayed. The record is updated as actual players win and lose against these coaches.

Game Breakers: An alternative to playing against a computer team is this new special challenge game. Players are presented with a list of situations to execute in order to win big bucks and advance to further levels. Like a "two minute drill," this mode tests the skill of players under pressure situations.

A complete Cyberball 2072 game has six three-minute periods. Playing with two players adds more time to the game clock per period. With the Atari buy-in-anytime feature, a second player can enter the action anytime during the game. If a game ends in a tie, there's a sudden-death period to settle the score. The first team to score is declared the winner.

Player Choices: Players can select offensive and defensive plays, timeouts, and replace weak or demolished players.

The new Cyberball 2072 has approximately 250 offensive and defensive plays to choose from. The offensive player can choose a running play, option play, pass play, or a time-out. After the player selects the type of play, four patterns appear to choose from. The computer chooses these four patterns based on the current ball status and yards to the defuse line or the goal line.

Meanwhile, the defensive player can choose a short, medium, or long defense. The computer also presents four patterns for the player to choose from.

If a Cyberball 2072 robot is damaged during the action by tackles or exploding shrapnel, the player can replace it with a better robot bought with team "funds," which are awarded for good performance. Two stages of breakdown identify damage to a robot. A smoking robot is the first warning that the robot is fatigued. A robot with smoke and fire means that a fumble will occur if tackled.

Special Offers: In "advanced" skill level games, new features have been added to allow for multiple upgrades and purchases during the game. At halftime, players may spend any portion of their team funds to upgrade their players. Even multiple upgrades of any one player is possible. Also, if your team is trailing at the end of the first, second, fourth, and fifth periods, you will have the option to use game credits (or deposit a credit at that time) to purchase top-level offensive players or stronger defensive lineups.

High Score Tables. Two unique high-score tables are used in Cyberball 2072. For games versus the computer, one table records the top scores posted versus each of the four coaches. A second table is used for "Game Breakers," recording the top money winners under this special challenge format.

End-of-Game Stats: Upon completing a game, a game "Stat Summary" is shown. It posts the statistical performance commonly evaluated in today's football, such as total yards, passing yards, running yards, completion percentage and interceptions.
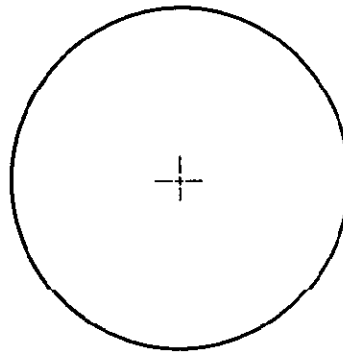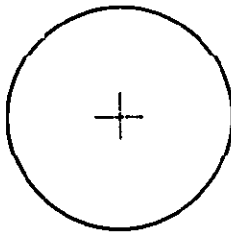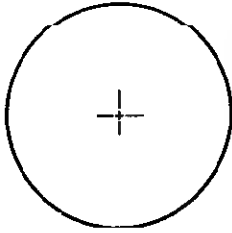
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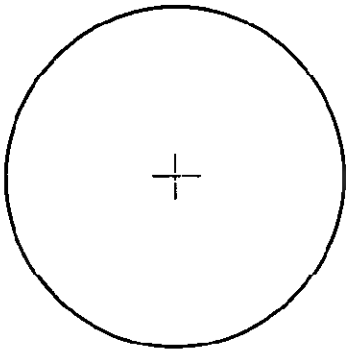EITHER BUTTON
TO START
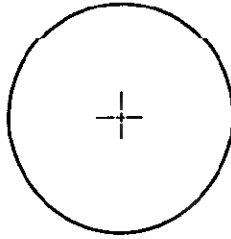
SELECT
PASS/LATERAL
TURBO DEFENSE
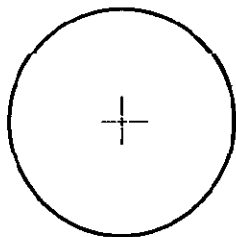
L LEFT PLAYER

PRESS
EITHER BUTTON
TO START

SELECT
PASS/LATERAL
TURBO DEFENSE

R RIGHT PLAYER

Self-Test

The Cyberball® 2072 game tests itself and provides visual and audible indications of the condition of the game circuitry and controls. Self-test information is displayed on the screen and through the sound system. No additional equipment is required.

We suggest that you perform a self-test when you first set up the game, each time you collect the money, or when you suspect game failure.

The self-test screens provide information about the game circuits and controls. To go into self-test, turn on the self-test switch located on the JSA II audio board in the drawer. If you turn on the self-test switch, and then turn on the game power, the game performs the RAM, ROM, and communications tests and then the switch test screen appears. If you turn on the self-test switch after the game power has been turned on, the self-test begins with the switch test.

To leave the self-test, turn off the self-test switch, and then exit the screen by pressing any right player button. To exit the switch test screen, press any left and any right player button together.
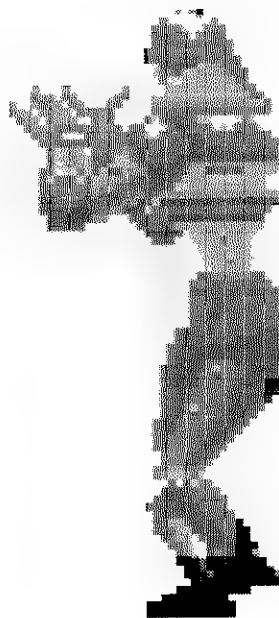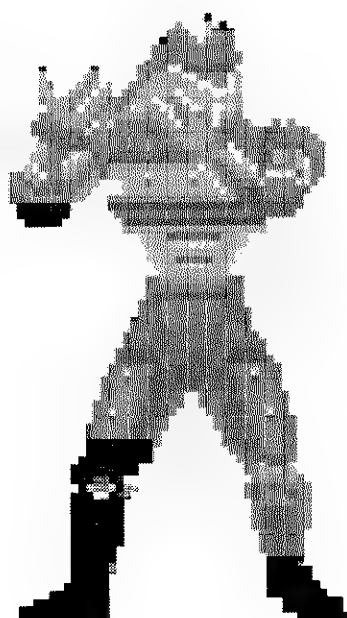
NOTE

You can perform the self-test two ways. If you turn on the self-test switch first, and then the power switch, the self-test starts with the RAM and ROM test.

If you turn on the power first, then the self-test switch, the self-test begins with the switch test.

RAM and ROM Test

The self-test checks the game RAM and ROM first. It begins by cycling through a series of RAM tests. If an area of RAM fails, it displays a location to check for a bad RAM.

If the test finds no RAM errors, then after a 30-second delay, the self-test goes to the ROM test without displaying a message. If the game has no ROM errors, then you will not see a message either.

If you have an error in any of these tests and you see a message, you can move to the next test by pressing the right player button.

If you have a RAM error, refer to Table 2-1 for the location of the problem. If you have a ROM error, see Table 2-2 for information about the location of the error. If you think you have a ROM error, but the screen shows no message, look at Table 3-4 for information about the locations of various ROM functions.

Table 2-1 RAM Error Locations

Error Message	Display Background	Location
Video RAM bad	Red	45F, 45J
Color RAM bad	Black	120F, 110F
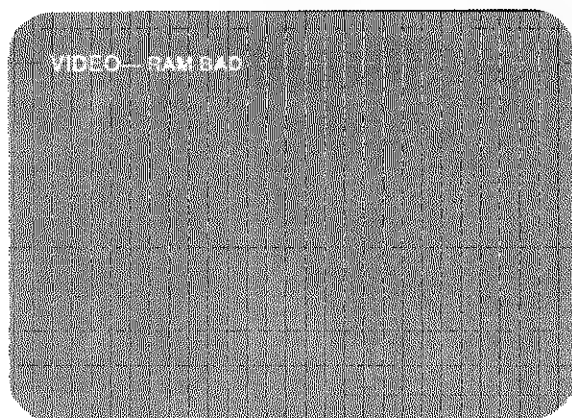
Figure 2-1 RAM Error Message

Table 2-2 ROM Error Locations

Error Address	Location on Game PCB	
000000	U=10C	L=10D
020000	U=21C	L=21D
040000	U=15C	L=15D
060000	U=27C	L=27D
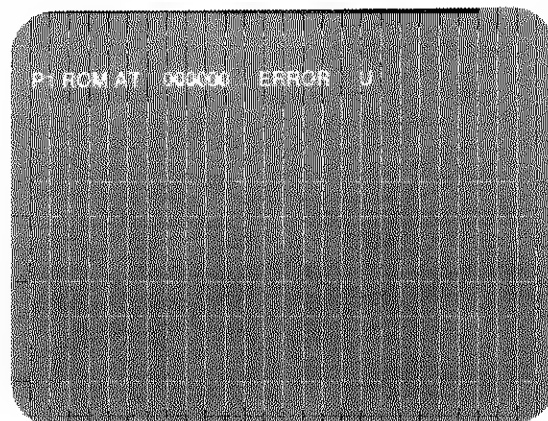
Figure 2-2 ROM Error Message

Switch Test

The switch test is shown in Figure 2-3. Use this test to check the controls. As you press the buttons and move the joysticks, the zeros on the screen should change to ones. If they do not, follow the maintenance and repair procedures for the controls in Chapter 3 of this manual. Press any right and any left player button together to move to the next screen.
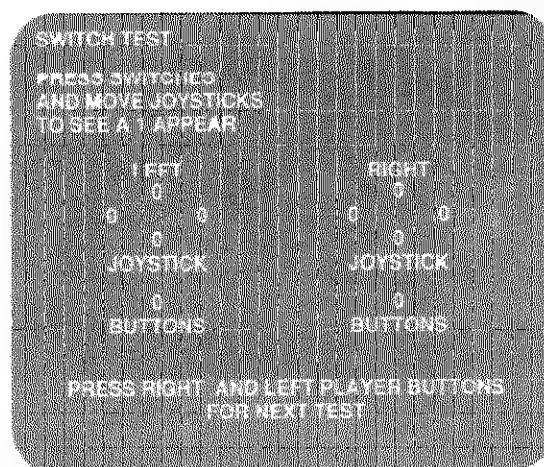

Figure 2-3 Switch Test Screen

Coin Options

Check and select the coin options on this screen. The screen is shown in Figure 2-4.

To move through the coin options, push the left joystick up or down. You can change the coin option shown in green. The factory default settings are shown in blue. To change an option setting, move the left joystick right or left.

Figure 2-4 Coin Options Screen

If you change an option, but then want to change it back to the previous setting, press either left player button. To save the new settings and exit from the screen, press either right player button.

If you want to exit the self-test, turn off the self-test switch, and press any right player button to exit the screen All your changes are saved and you return to the attract mode.

The coin options are explained below The settings, with defaults, are shown in Table 2-3.

Table 2-3 Coin Option Settings

Option	Settings
Game Price	One coin ✦ Two coins Three coins Four coins
Multiplier	1 ✦ 2 3 4 5 6 7 8
Bonus Adder	None ✦ 2 coins give 1 extra coin 4 coins give 1 extra coin 4 coins give 2 extra coins 5 coins give 1 extra coin 3 coins give 1 extra coin Free Play (for demonstration mode)
✦ *Manufacturer's recommended settings*	

- *Game Price* is the number of coins required for one credit.

- *Multiplier* is the number of coins each coin counts as in the coin mechanisms. For example, if you select 2, then each coin counts as two coins

- *Bonus Adder* lets you choose bonus coins, no bonus, or free play.

Game Options

Check and select the game options on this screen. The screen is shown in Figure 2-5.

To move through the game options, push the left joystick up or down. You can change the coin option shown in green. The factory default settings are shown in blue. To change an option setting, move the left joystick right or left.
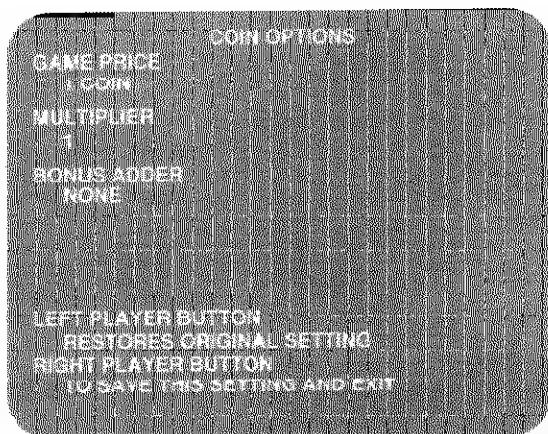
If you change an option setting, but then want to change it back to the previous setting, press either left player button. To save the new settings and exit from the screen, press any right player button.

If you want to exit the self-test, turn off the self-test switch, and press any right player button to exit the screen. All your changes are saved and you return to the attract mode.

NOTE

Not all of the options are shown when you enter this screen. The word More *shows at the bottom of the screen to indicate more options. Use the left joystick to scroll through the options.*
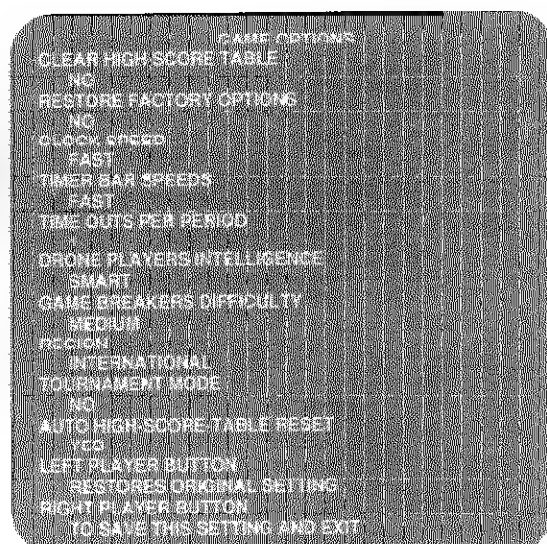

Figure 2-5 Game Options Screen

The game options are explained below. The settings, with defaults, are shown in Table 2-4.

■ *Clear High Score Table* clears the high score table, if it is set to yes.

■ *Restore Factory Options* allows you to set all the game options to the factory options by choosing yes. If you want to use your own settings, be sure to set this to no.

■ *Clock Speed* sets the amount of time the players receive per play period.

■ *Timer Bar Speeds* controls the amount of time given on the timer bar shown on the play selection screen.

■ *Time-Outs Per Period* is the number of time-outs a player is permitted per play period.

■ *Drone Players' Intelligence* controls the responsiveness of the defensive players on the field. You can choose average, smart, or very smart. The higher the intelligence level, the faster the defense reacts. This setting does not affect the length of play time.

■ *Game Breakers Difficulty* adjusts the "ante" levels in each game breakers page.

■ *Region* selects the region of teams (see Table 2-5).

■ *Tournament* allows you to turn on or off special game offers for tournament play.

■ *Auto High-Score-Table Reset* automatically clears the high score table if 2,000 games have been played, and if at least 200 games have been played since the last player entered the high score table.

Table 2-4 Game Option Settings

Option	Settings	
Clear High Score Table	No ✦	Yes
Restore Factory Options	Yes	No ✦
Clock Speed	Very slow	Slow
	Fast ✦	Very Fast
Timer Bar Speeds	Very Slow	Slow
	Fast ✦	Very Fast
Time-Outs Per Period	1 ✦	2
Drone Players' Intelligence	Average	Smart ✦
	Very Smart	
Game Breakers Difficulty	Easy	Medium ✦
	Hard	
Region	International ✦	West
	Central	East
Tournament Mode	No ✦	Yes
Auto High-Score-Table Reset	No	Yes ✦

✦ *Manufacturer's recommended settings*

Table 2-5 Regions

ICBL WEST
San Francisco Crush
Phoenix Flash
Seattle Thunder
San Diego Machine
Honolulu Invasion
Los Angeles Lightning

ICBL CENTRAL
Kansas City Crush
Denver Flash
Chicago Thunder
Dallas Machine
Pittsburgh Invasion
New Orleans Lightning

ICBL EAST
Washington Crush
Philadelphia Flash
New York Thunder
Miami Machine
New England Invasion
Atlanta Lightning

ICBL INTERNATIONAL
California Crush
Tokyo Flash
New York Thunder
Moscow Machine
Berlin Invasion
London Lightning

Statistics Screens

Use the information shown on the two statistics screens and on the histogram screen to keep track of your game use. Record the information on the Cyberball 2072 statistics page in the back of this manual.

The information shown on the two statistics screens (shown in Figures 2-6 and 2-7) is accumulated from the last time the statistics were reset.
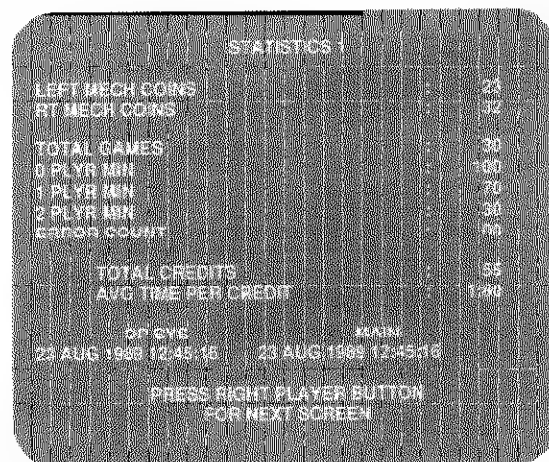

Figure 2-6 First Statistics Screen

At the bottom of the first statistics screen are several times and dates. These are the program version dates. If you are having problems with your game, you may need to give Atari Games Customer Service this information.

You can reset the statistics when you are on the second statistics screen by moving the left joystick and pressing any left player button.
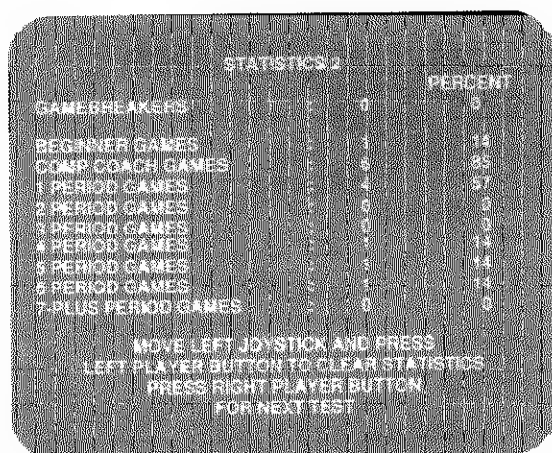
First Statistics Screen

The first statistics screen shows the following:

■ *Left/Right Mech Coins* show the number of coins in each of the game's two coin mechanisms.

■ *Total Games* shows the number of unique games played. A unique game is counted from the first player starting to the last player quitting, regardless of how many times the game was continued, or how many people played.

■ *0 Plyr Min* is the number of minutes the game was idle.

■ *1/2 Plyr Min* are the number of minutes the game was played by one or two players.

■ *Error Count* shows the number of errors counted in the erasable memory. If you have a count of more than 75, you should have your game serviced by a qualified service technician.

■ *Total Credits* is calculated by multiplying the coins by the credit setting you chose in *Game Price*.

■ *Avg Time Per Credit* is the average amount of time in seconds that each credit gave.

Second Statistics Screen

The second statistics screen shows the following statistics both as the amount and as a percentage of the total games played.

Figure 2-7 Second Statistics Screen

■ *Beginner Games* is the number of games played in beginner mode.

■ *Comp Coach Games* is the number of games played under the beat-the-coach format.

■ *Game Breakers* is the number of games played under this unique format.

■ *1 Period Games* is the number of games in which the player(s) played for only one period of the complete six-period Cyberball 2072 game.

■ *2/3/4/5/6 Period Games* show the number of games in which the player(s) played for two to six periods.

■ *7-Plus Period Games* shows the number of games in which the player(s) played for seven or more periods. This means that the player(s) completed at least one Cyberball 2072 game and started another.

Playfield Scrolling Test

You can test the playfield scrolling circuitry in this screen. Use the left joystick to move left, right, up, and down. The screen is shown in Figure 2-8.

Exit the screen by pressing any right player button.
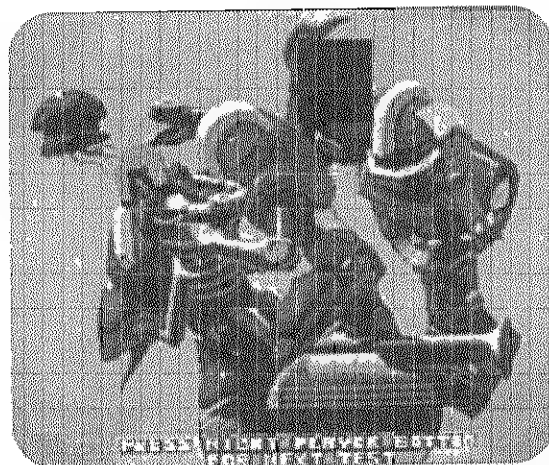

Figure 2-8 Playfield Scrolling Test

Motion Object Test

The motion object test screen is shown in Figure 2-9. This tests the movement and color of various game objects.

Choose a stack with the left player button. Use the left joystick to move the stack. Press the left player button to move to the next stack.

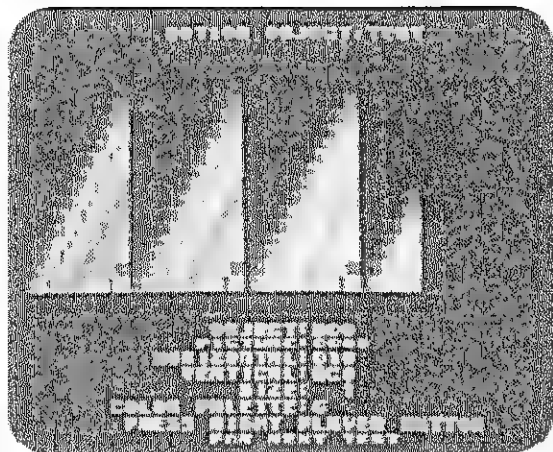Exit the screen by pressing any right player button.

Figure 2-9 Motion Object Test

Alphanumerics Test

The alphanumerics test checks the condition of the alphanumerics in the game. The screen is shown in Figure 2-10.

If you see an error on the screen, check the EPROMS at 15N and 16N.

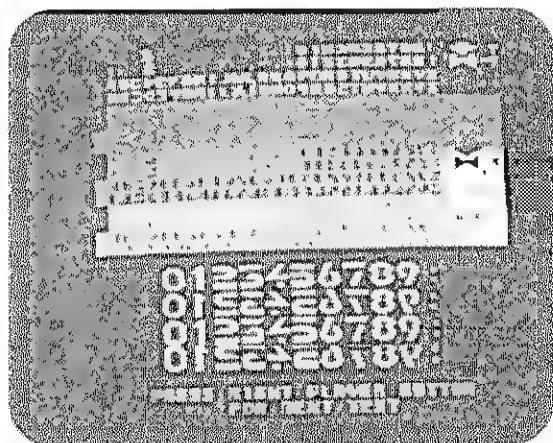Press any right player button to go to the next test.

Figure 2-10 Alphanumerics Test

Color Test

This test indicates the condition of the video display color circuits. The screen is shown in Figure 2-11.

The left side of the screen should be black and change to grey in the middle. To the right of the grey the screen should appear red, green, blue, and white from top to bottom.

If the screen does not fit this description, see the video display manual included with the game for adjustments.

Figure 2-11 Color Test

Exit the screen by pressing any right player button.

Color Purity Test

The color purity test has five screens. The first screen is shown in Figure 2-12.
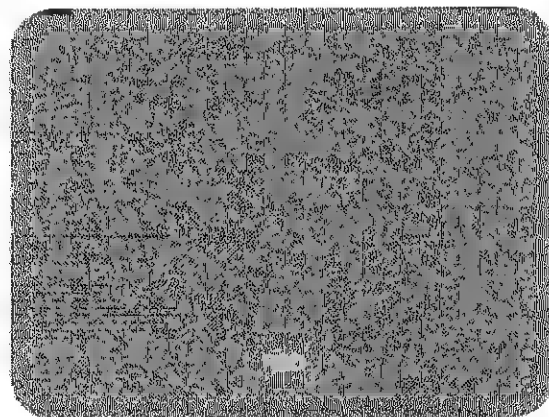
Figure 2-12 Color Purity Test

These screens show the condition of the color purity circuit in the video display. Each screen should display a rectangle of color, with no curving at the corners and no lines in the display. The screens are red, green, blue, white, and gray.

If the screens are not correct, see the video display manual included with the game for adjustments.

Exit each screen by pressing any right player button.

Convergence Test

The convergence test is shown in Figure 2-13. This test has three screens. The first is white, the second is purple, and the last is green.
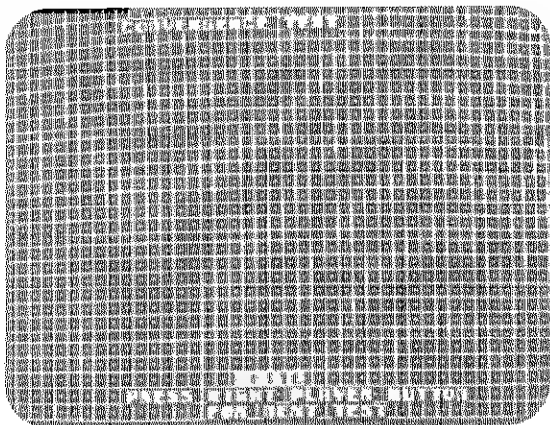
Figure 2-13 Convergence Test

Check the following on the screens:

■ The grid lines should be straight within 3.0 mm and the lines should not pincushion or barrel.

■ The convergence of the lines on the violet and white screens should be within 2.0 mm.

If these screens do not meet these criteria, see the video display manual for suggested adjustments.

Exit the screen by pressing any right player button.

Sound Test

The sound test indicates the condition of the music and sound effects circuits on the JSA II Audio PCB. The sound test screen is shown in Figure 2-14. The sound microprocessor resets at the beginning of the test. You will hear the first sound three seconds after the test starts.
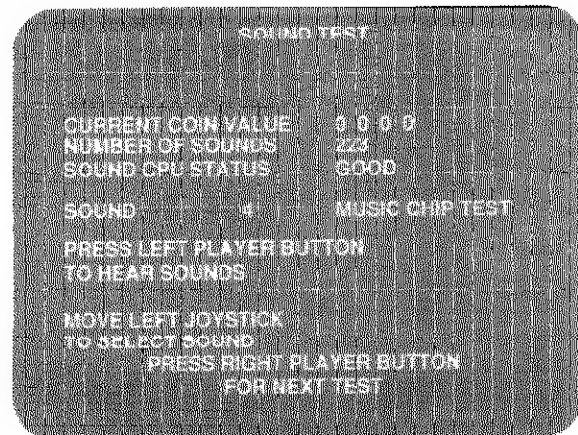

Figure 2-14 Sound Test

After the microprocessor is reset and you hear the first sound, the number of game sounds and the sound CPU status information appear. If the CPU is good, the word "Good" appears. If you get an error message at any point in the sound test, see Table 2-6 for more information.

The test cycles through the following tests:

■ Music Chip Test
■ Sampled Audio Test
■ SCOM Reset Test

Use the left joystick and the left player buttons to select sounds and listen to them.

To leave the self-test, switch off the self-test switch, and then press any right player button. You will return to the attract mode.

Table 2-6 Faulty Sound RAM and ROM Locations

| Error Message	Location on JSA Audio PCB	Cause or Comment
Music Chip Time Out	3A	
Sound CPU RAM 1 Error	2B	
Sound CPU ROM 1 Error	1B	If this message appears when you enter the sound test, the sound processor cannot proceed any further. Press the left jump button to exit the test.
Communications Error #1	3D	Counts the number of errors caused by the audio or game PCB. This means that the SCOM chip (part no. 137526-001) on one of these boards is bad. **CAUTION** *The SCOM chip is a CMOS IC and is static-sensitive. If you do not handle it properly you can permanently damage it. See the section* Static-Sensitive Devices, *in Chapter 9, for more information.*
Communications Error #2		Probably the audio PCB is disconnected from the game PCB, or the chip at 1D is not inserted into its socket.
Sound Processor Not Responding		A major problem with the audio PCB. If you cannot enter the self-test, the harness may be disconnected between the audio PCB and the game PCB.

Maintenance and Troubleshooting

This chapter contains regular maintenance information, troubleshooting tables, and repair procedures for your Cyberball 2072 game.

The chapter has two parts. The first part contains three troubleshooting tables. One table has general troubleshooting information, the second contains the voltage levels and test points on the PCBs, and the last is a table of ROM-caused problems with specific ROMs to check and replace.

The last part of the chapter has information about connecting the video display to the Cyberball 2072 kit and maintenance procedures for the joystick.

If a part is mentioned, but not illustrated, see Chapter 4, *Illustrated Parts Lists*, for information.
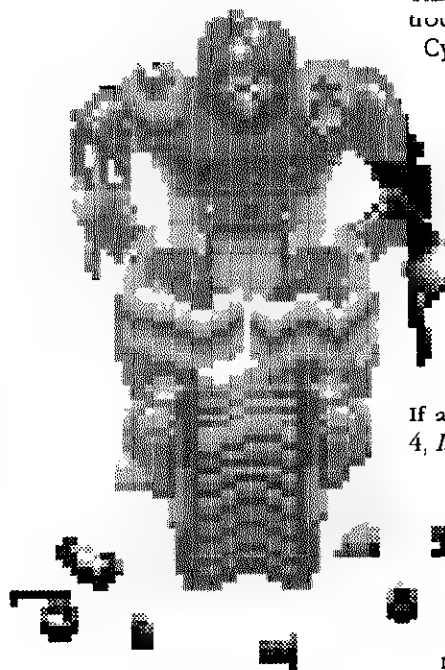
Video Display Sync Problems

Some video displays cannot use the composite negative sync that is on the JAMMA connector. The Cyberball 2072 kit includes a standard Atari video connector that provides separate positive sync. Refer to Table 3-4 and make the appropriate connections for your video display. For other problems, see the video display manual that came with your game.

Joystick Procedures

The joystick provides your game with precise movement and speed control of the player's character. For best performance, lubricate the joystick regularly.

Maintaining the Joystick

Maintain the joystick by inspecting the pivot ball, actuator half-ball, and the shaft and lubricating the joystick with lithium grease.

1. Turn off the power to the game.

2. Open the control panel and disconnect the harness connector.

Table 3-1 Troubleshooting Suggestions

Problem	Suggested Action
Coin Mechanism Problems	Test the coin mechanisms with the sound test screen in the self-test
Game Play Problems	1 Check the harness and connectors. 2. Perform the self-test. 3 Check the voltage levels on the PCBs See Table 3-2, *Voltage Inputs and Test Points.* 4 Check *What ROM Problems Look like,* Table 3 3, for specific ROM problems.
A screen character does not move or moves intermittently	Check the connections
Joystick Problems	1. Has the joystick been lubricated with white lithium grease? If not, lubricate. 2. Check the harness and connectors 3. If you took the joystick apart, have you reassembled it correctly? 4. Make sure all the parts on the joystick are in good repair Repair or replace parts.
The handle does not immediately return to center	1. Make sure the actuator is installed correctly. 2. Lubricate the joystick.
A joystick handle sticks.	1. Check if the screws holding the joystick assembly together are too tight. 2. Lubricate the assembly.
Sound Problems	1. Is the speaker volume turned up? 2 Check the audio ROM and RAM in the self-test on the Sound Test screen. See Table 2-4, *Bad Sound RAM and ROM Locations* 3 Check the voltage level to the JSA II Audio PCB. See Table 3 2, *Voltage Inputs and Test Points* 4 Check the wiring from the JSA II Audio PCB to the speaker 5. Replace the speaker
Video Display Problems Screen is Dark	1 Is the game plugged in? 2 Is the game turned on? 3 Are the connections good? 4 Check all of the items below If you can answer *no* to any question, you have a problem with the video display. See your video display service manual. a. Do you have power to the video display? b Are the video display's filaments lit? c. Do you have high voltage to the video display? 5 Is the voltage level to the video display PCB correct? (Power voltage is 100 VAC or 110 VAC, depending on the type of video display. Video signal voltage is 0.5 to 3.5 Volts) 6. If the level is not correct, check the connectors and the harness. 7 Check the +12 V and the +10 V circuit on game PCB
Display area wavers or is too small	1 Check the voltage to the video display PCB. 2 Do you have high voltage to the video display?
Convergence, purity or color problems	Use the screens in the self test to adjust the video display.
Game is Stuck in Self-Test	Make sure the self-test switch is switched off If it is switched on, then the game will be in self test.

3. Remove the joystick from the control panel. Use a 3/8-inch wrench to remove the nuts and washers that hold the joystick on the control panel.

4. Remove the four long screws that hold the joystick together. See Figure 3-1.

5. Take off the 8-position plate, the actuator, and the lower housing.

6. Check the actuator half-ball, the pivot ball, and the shaft for dirt and wear.

Table 3-2 Voltage Inputs and Test Points on the PCBs

PCB	Voltage	Test Point or LED	Source and Purpose
Main	+5 ± 0.25 VDC	VCC1	Logic power from the switching power supply.
Main		CR1 LED	Lights when 5 V is applied to the main PCB and the reset (RST) jumper is open
Audio		CR4 LED	Lights when the −5 V supply is good.
Audio		CR3 LED	Lights when the +5 V supply is good
Audio		CR5 LED	Lights when the +12 V supply is good (but only if the JSA II Audio PCB has a 12 V resistor at Q3 on it).

Table 3-3 What ROM Problems Look Like

Problem	ROM Causing Problem	Check the ROM at:
Program works but letters and numbers appear wrong	Alphanumeric	32L, 32N
Program works and the playfield looks OK, but the motion objects are wrong.	Motion object	61N, 61L, 66N, 66L, 55L, 55N, 90L, 90N, 43L, 43N, 78L, 78N
Program works, motion objects look OK, but the playfield is wrong.	Playfield	10K, 16F, 16K, 10F
Garbage on screen; program doesn't work.	Video processor	20A
Game program is erratic.	Video program ROM 0, 1, 2, 3, 4, 5, 6, 7	10C, 10D, 21C, 21D, 15D, 15C, 27C, 27D
No sound or erratic sound.	Audio ROM	1B on the JSA II Audio PCB

7. Lubricate the actuator half-ball on the end of the joystick shaft, the pivot ball below the upper housing, and the spring inside the upper housing. Use lithium grease.

8. Put the joystick assembly back together. Fit the pin in the pivot ball into the slot in the lower housing.

9. Replace the long screws and tighten them. Do not over-tighten the screws. The joystick handle must return to center easily.

NOTE

Do not tighten the long screws too much. If you do, the handle will be difficult to move and players may become frustrated with the game.

---

10. Replace the joystick assembly on the control panel.

11. Use the Self-Test to make sure you have reassembled the joystick correctly.

Table 3-4 Atari Video Connector Pin Assignments

Pin	Signal
1	Red
2	GND
3	Key (no connection required)
4	Green
5	GND
6	Blue
7	GND
8	GND
9	Negative composite sync
10	Positive V sync
11	Positive H sync

Lithium Grease

Ball-Shaped Handle
and Shaft

Disc

Plunger Spring

Plunger

Upper Housing
Assembly

Upper Housing

Lower Housing

#4-20 Screw

Snap Action
Switch

Actuator

Cushion Ring

Pivot Ball

.125" Dia Roll Pin

#8-16 X-Rec
Screw

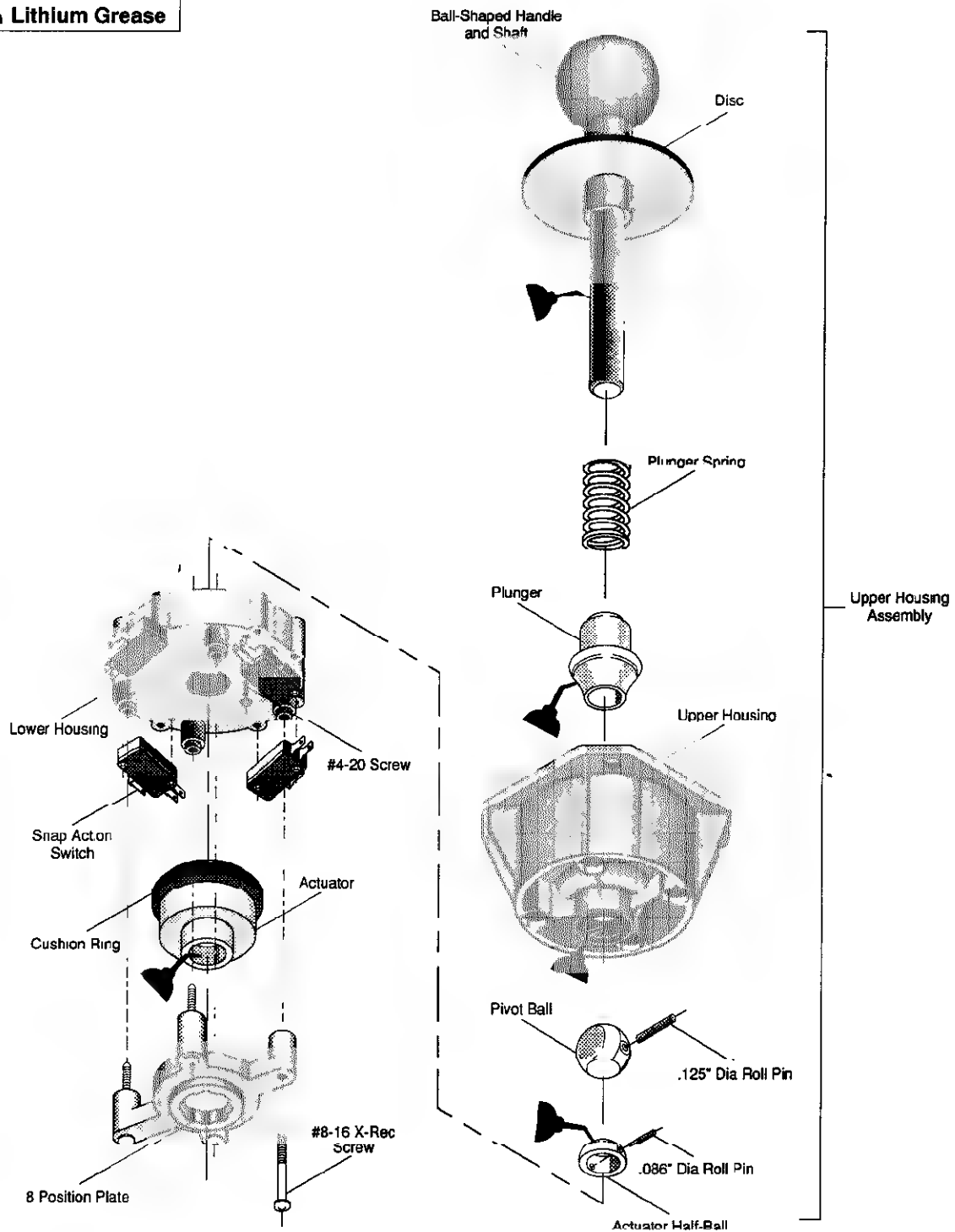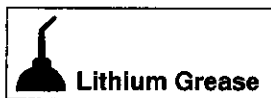.086" Dia Roll Pin

8 Position Plate

Actuator Half-Ball

Figure 3-1 Maintaining the Joystick

Illustrated Parts Lists

This chapter provides information you need to order parts for your kit.

The parts lists (except for the PCB parts list) are arranged alphanumerically by Atari part number. All "A-" prefix numbers, which are assemblies, come first. Next are part numbers with six numbers followed by a hyphen (000598- through 201000-) Ending the list are part numbers with a two-number designation followed by a hyphen (00- through 99-).

The PCB parts list is arranged in alphabetical order by
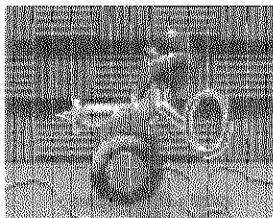
component Within each section the parts are arranged numerically by part number.

When you order parts, give the part number, part name, the number of this manual, and the serial number of your kit. With this information, we can fill your order rapidly and correctly. We hope this will create less downtime and more profit from your kit

Atari Games Customer Service telephone numbers are listed on the inside front cover of this manual.

Figure 4-1 Cyberball 2072 Universal Kit Assembly
A047400-01 B

Parts List

Part No.	Description	Part No.	Description
A047295-01	Cyberball 2072 Board Set Assy, consisting of the following items:	047209-01	Control Panel Cover
		047401-01	19-inch Display Bezel with Graphics
	A047066-01 Cyberball 2072 PCB Assy	047402-01	Universal Attraction Film with Graphics
	A047184-01 JSA II Audio PCB Assy	047403-01	Universal Control Panel Decal
	178275-016 1" PCB Support Standoff		
		047404-01	Control Functions Labels
A040933-03	8-Position Microswitch Joystick	160044-001	Snap-Action Microswitch
A046501-01	JAMMA Harness Assembly	177010-240	#10-24 Poly Locknut
038158-01	Product ID Label	178114-032	Polypropylene, Clear, 2-Inch-Wide Tape
039450-01	FCC Label		
		178237-003	Black Button Assembly
046184-01	Left Coinage Decal	178237-004	White Button Assembly
046184-02	Right Coinage Decal	178265-001	Nylon Standoff
047091-01	Side Panel Decal	72-6612S	Type AB, Cross-Recessed, #6 x 3/4-Inch-Long Screw
047205-01	Attraction Shield		
		75-5116B	#10-24 x 1-Inch-Long Carriage Bolt
		TM-339	Cyberball 2072 Universal Kit Installation Instructions

107027-001
Lithium Grease

040304-01
Ball-Shaped Handle
and Shaft

039713-01
Disc

043696-01
Plunger Spring

039712-01
Plunger

A047010-02
Upper Housing
Assembly

041287-01
Lower Housing

176030-110
#4-20 Screw

039722-01
Upper Housing

160044-001
Snap-Action
Switch

039714-01
Actuator

044390-01
Cushion Ring

039716-01
Pivot Ball

73-20824
.125" Dia Roll Pin

176018-003
#8-16 X-Rec
Screw

73-20509
.086" Dia Roll Pin

039717-03
8-Position Plate

040603-01
Actuator Half-Ball

**Figure 4-2 Joystick Assembly
A040933-03 G**

Figure 4-3 Joystick PCB Assembly
Parts List

Part No.	Description	Part No.	Description
A040932-01	Upper Housing Assembly	040693-01	Actuator Ball
039712-01	Plunger	041287-01	Lower Housing
039713-01	Disc	043696-01	Pregressive Plunger Spring
039714-01	Actuator	044390-01	Cushion Ring
039716-01	Pivot Ball	107027-001	Lithium Grease
039717-03	8-Position Plate	160044-001	Snap Action Switch
039722-01	Upper Housing	1760018-003	#8-16 Phillips Head Screw
040304-01	Ball-Shaped Handle and Shaft	176030-110	#4-20 Hex Washer Head Screw
		73-20509	Small Roll Pin
		73-20824	Large Roll Pin
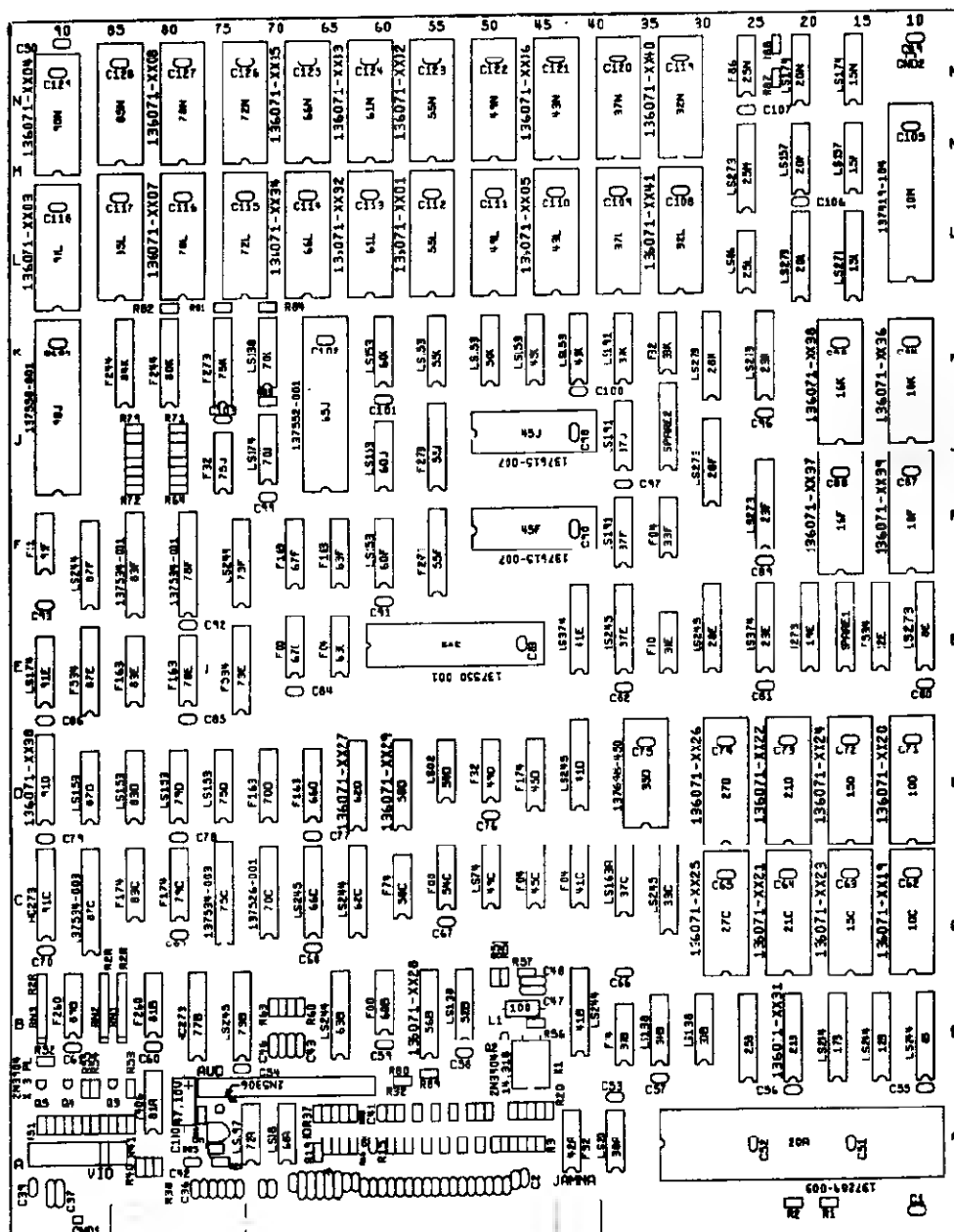
**Figure 4-4 Cyberball 2072 Game PCB Assembly
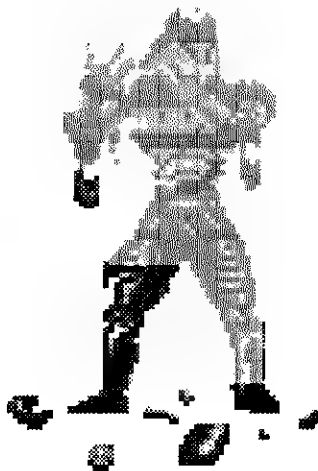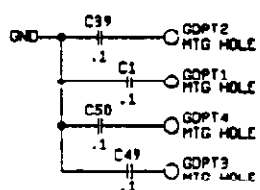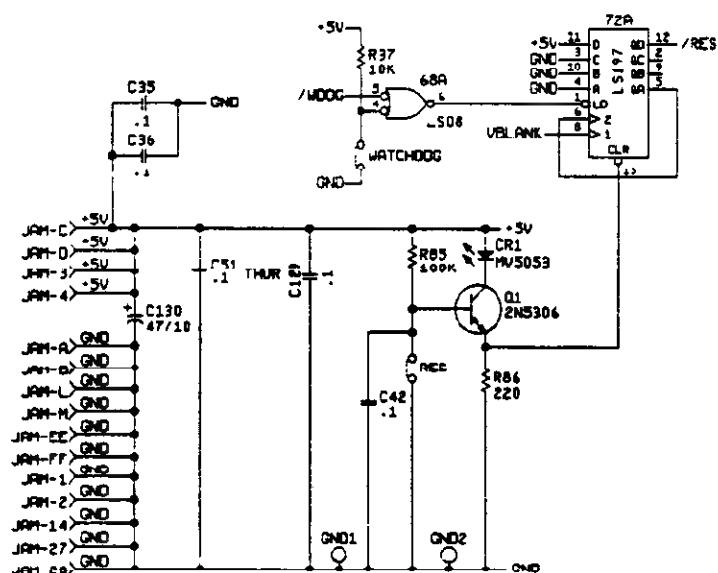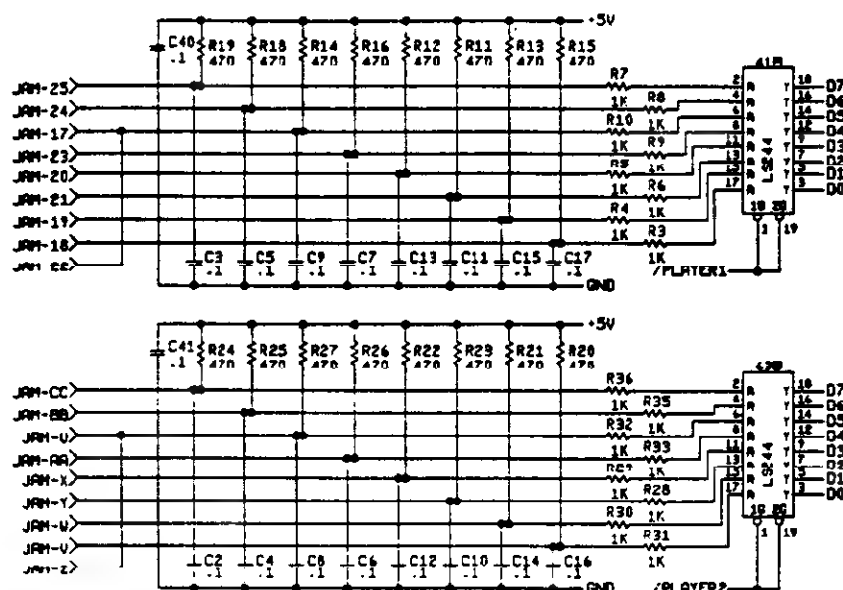A047066-01 C**
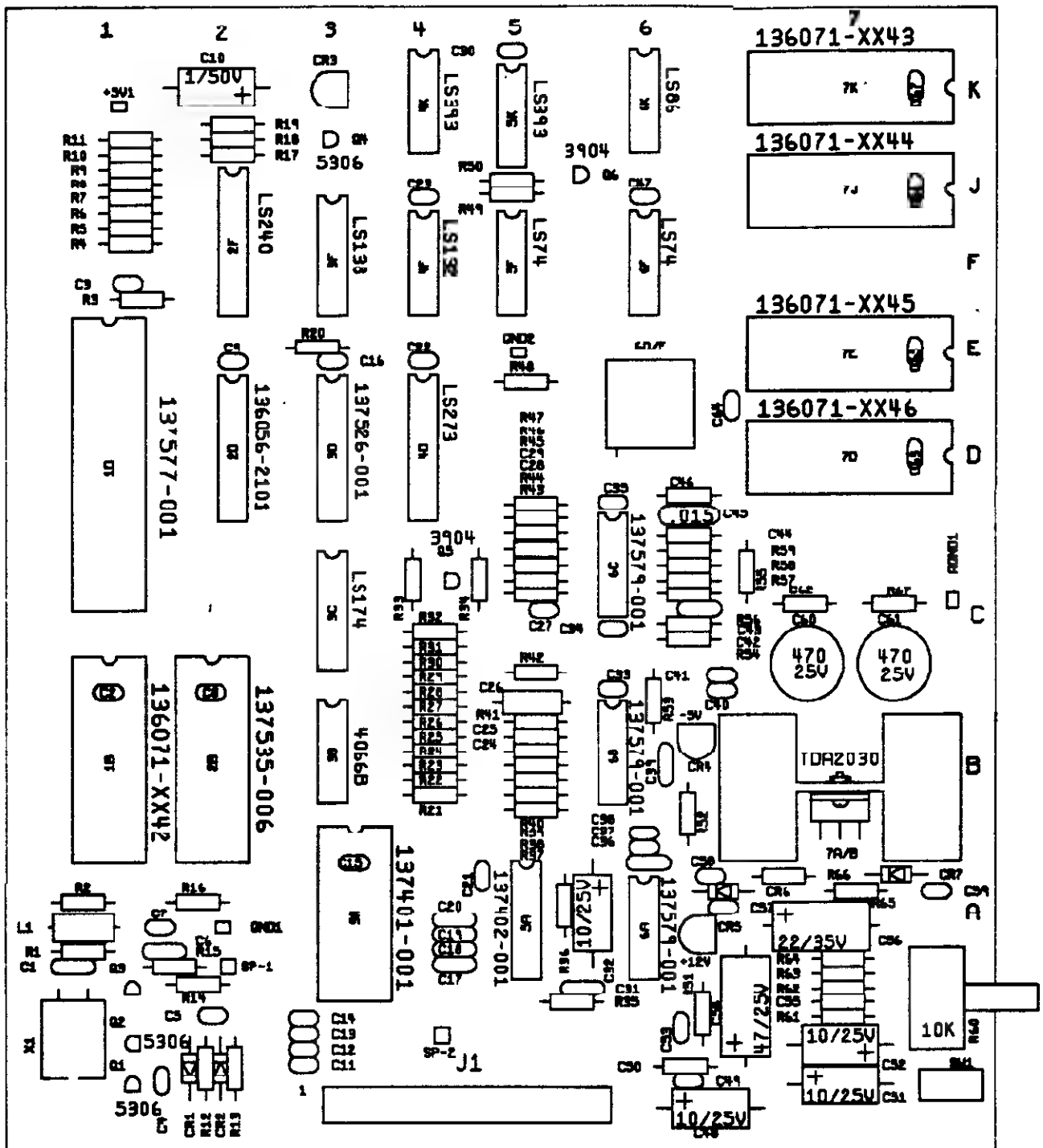
Figure 4-5 JSA II Audio PCB Assembly
A047184-01 B

Schematic Diagrams

About this Chapter...

This chapter contains the schematics and wiring diagrams for your Cyberball 2072™ game. They are arranged in the following order: Game PCB, JSA II Audio PCB, and Memory Map. (The PCB *assembly* drawings are illustrated in Chapter 4.)
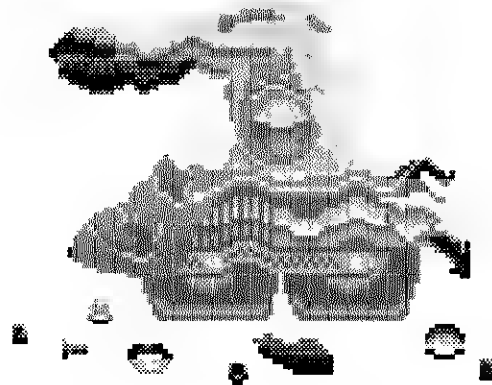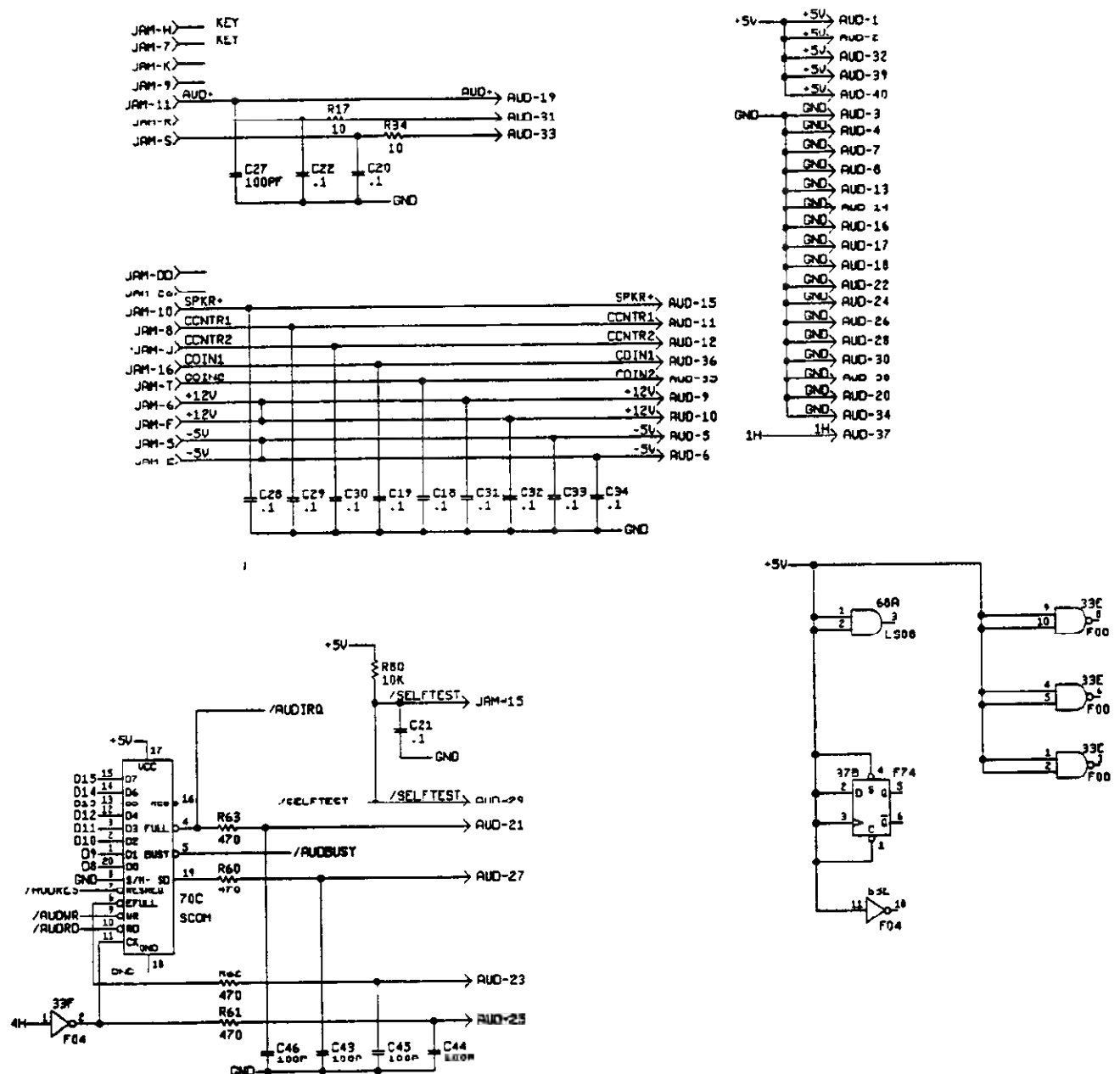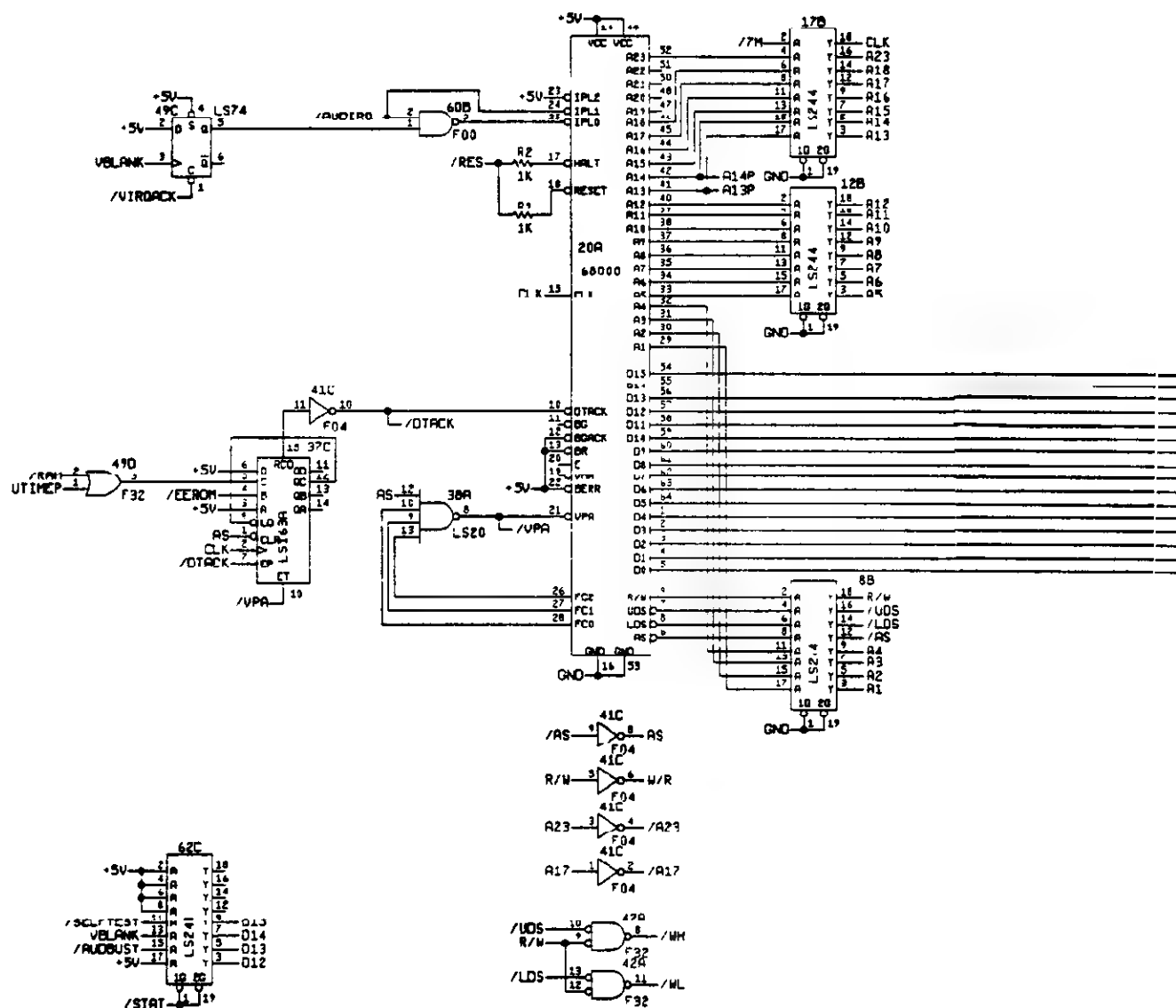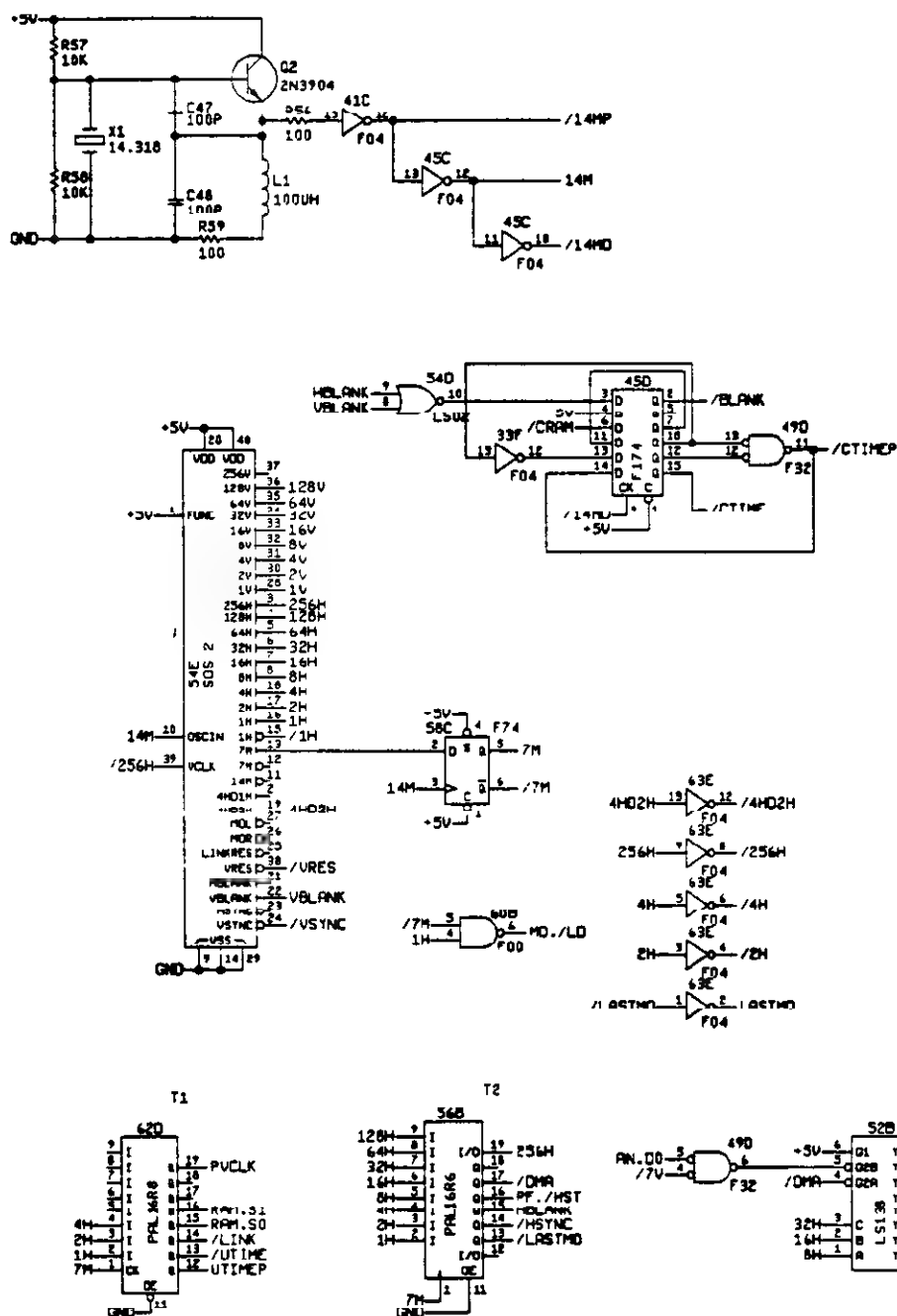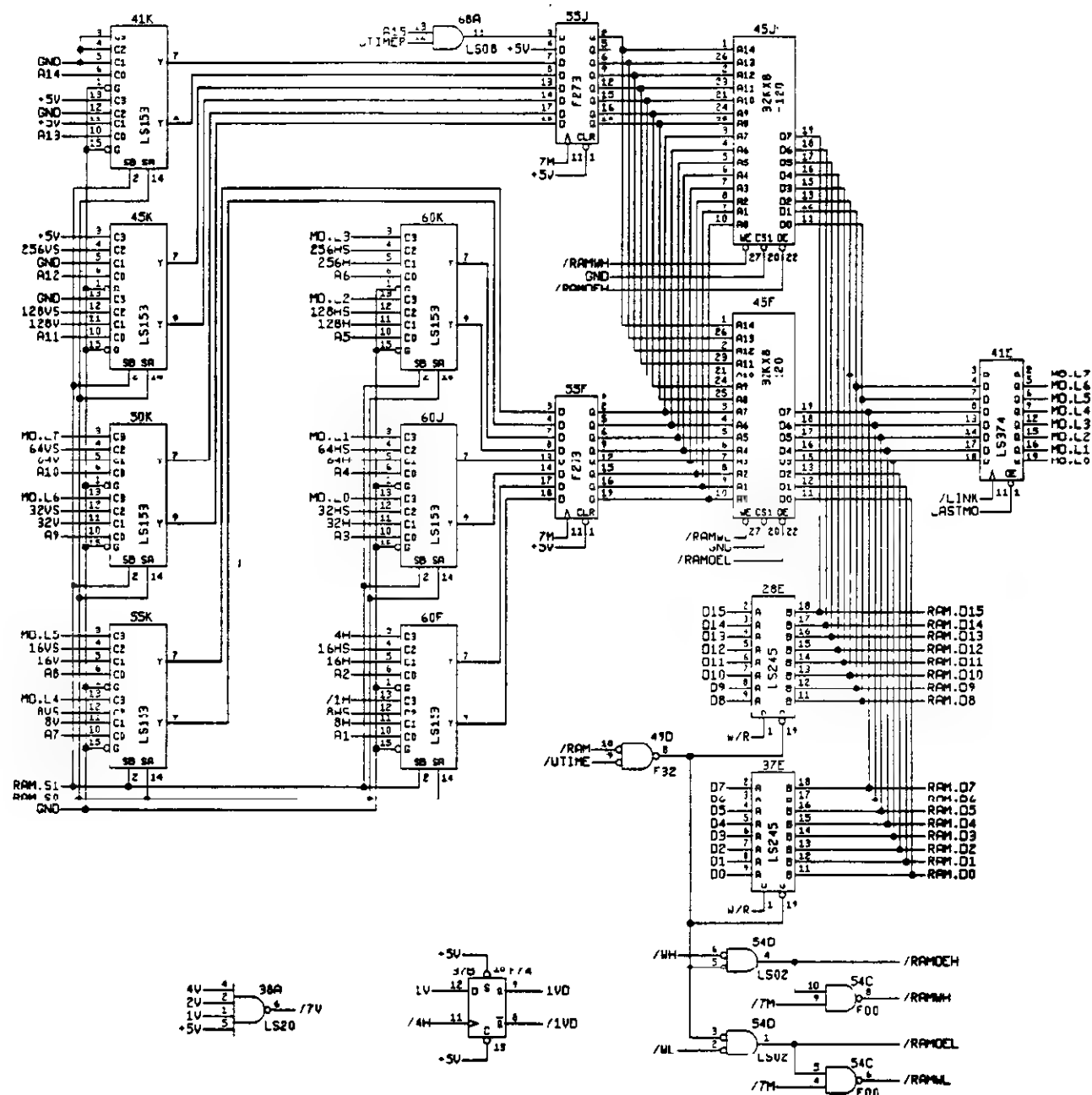
**Figure 5 1 Cyberball 2072 PCB Assembly Schematic Diagram,
Sheet 1 of 7**

047067-01 C

**Figure 5 1 Cyberball 2072 PCB Assembly Schematic Diagram,
Sheet 2 of 7**

047067-01 C

**Figure 5 1 Cyberball 2072 PCB Assembly Schematic Diagram,
Sheet 3 of 7**

047067-01 C

**Figure 5 1 Cyberball 2072 PCB Assembly Schematic Diagram,
Sheet 4 of 7**

047067-01 C
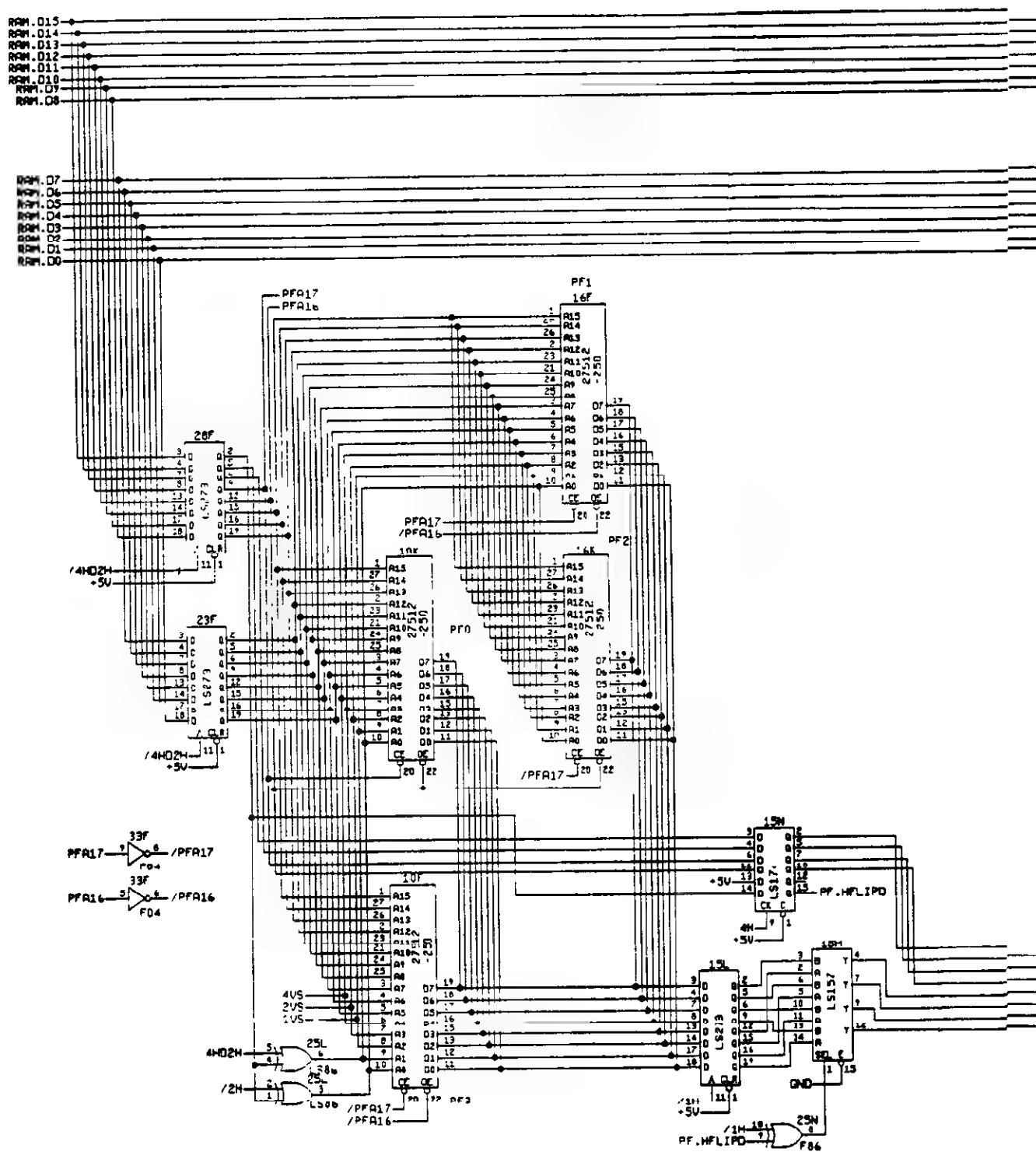
**Figure 5 1 Cyberball 2072 PCB Assembly Schematic Diagram,
Sheet 5 of 7**

047067-01 C
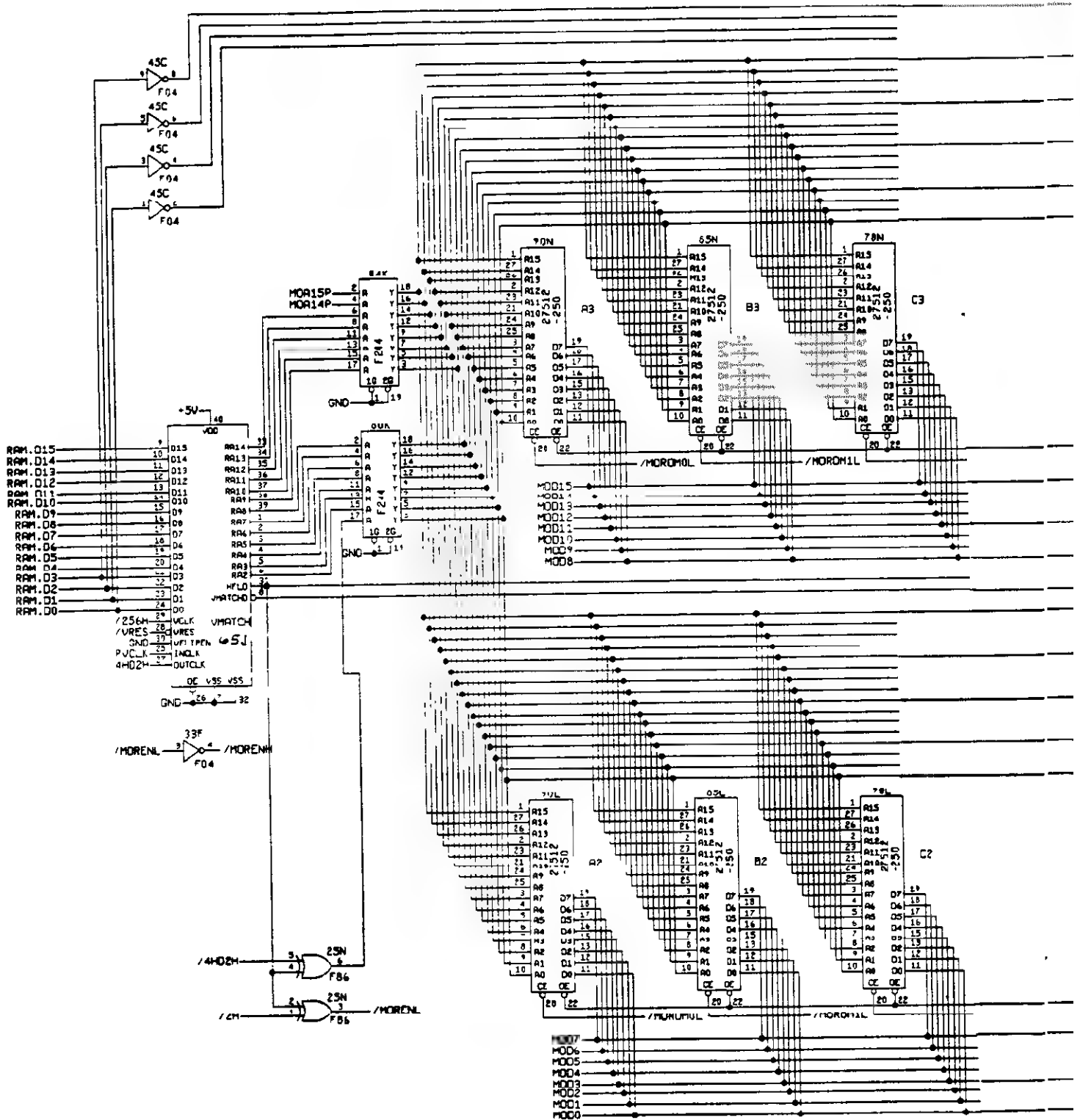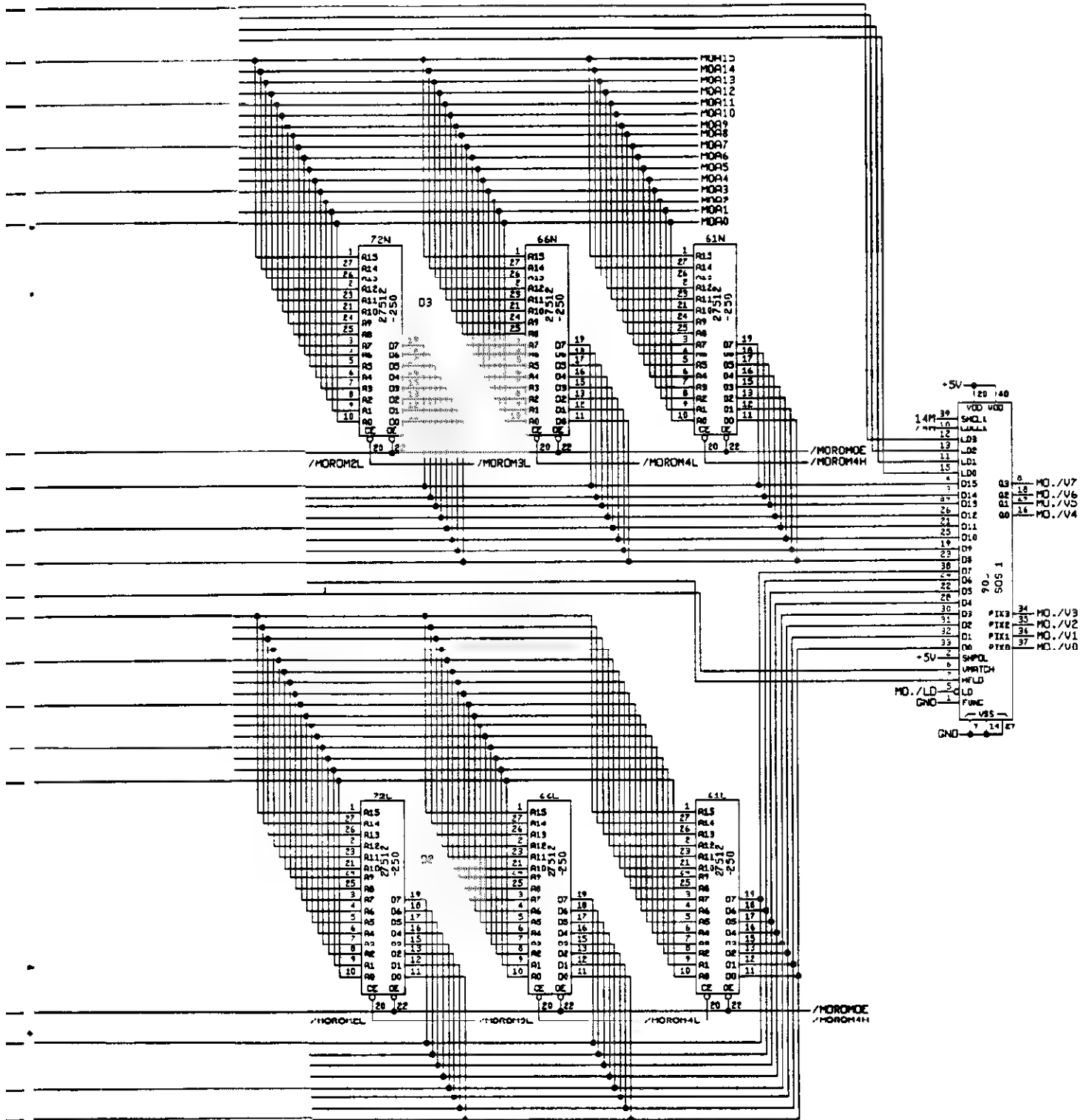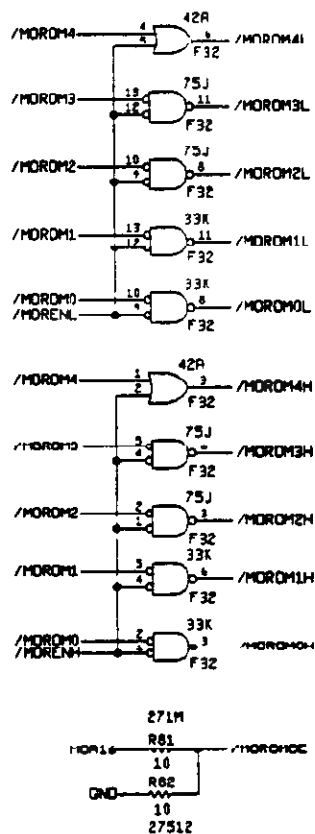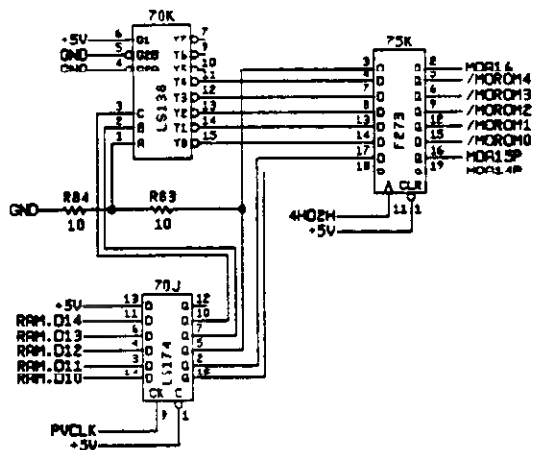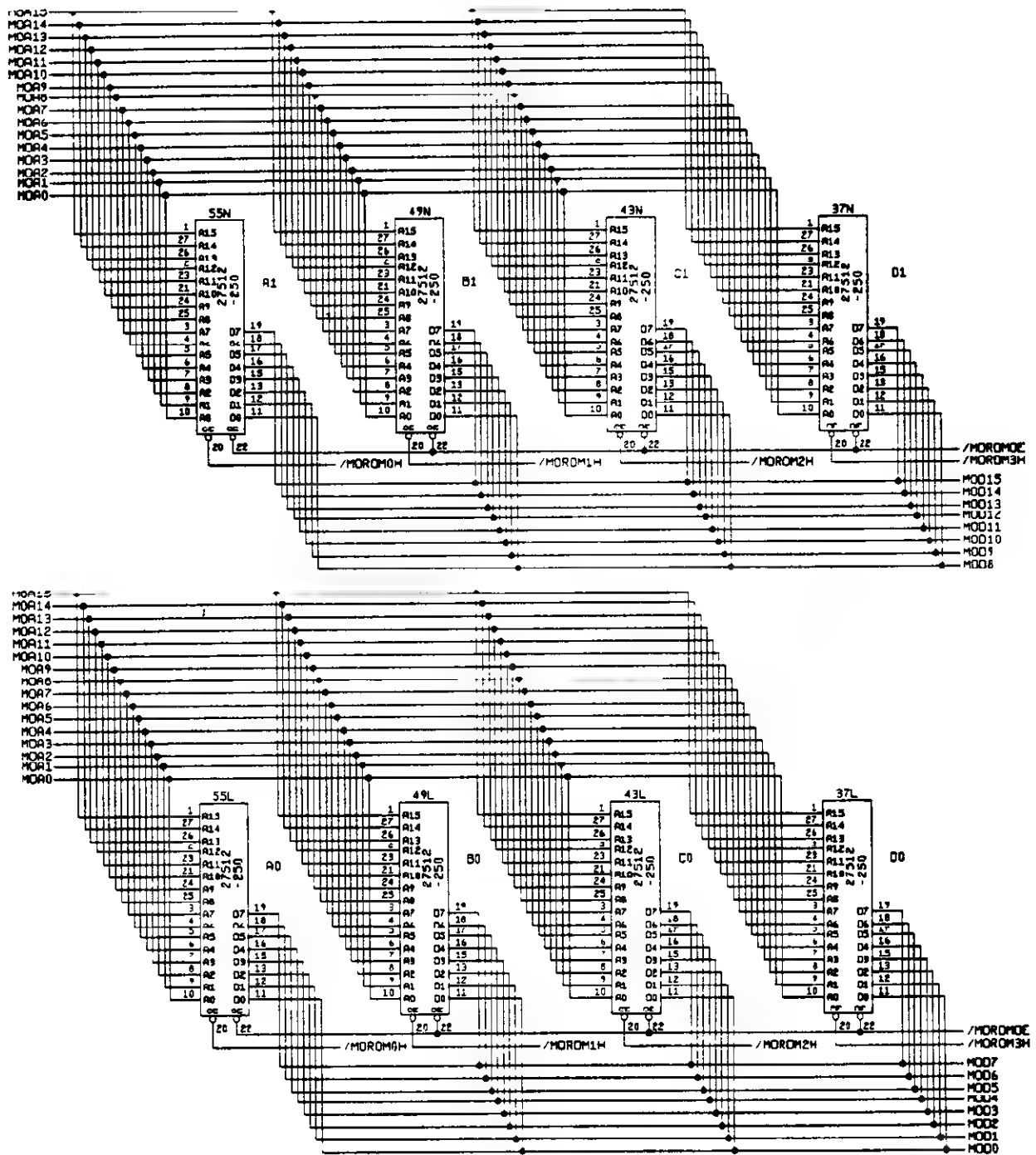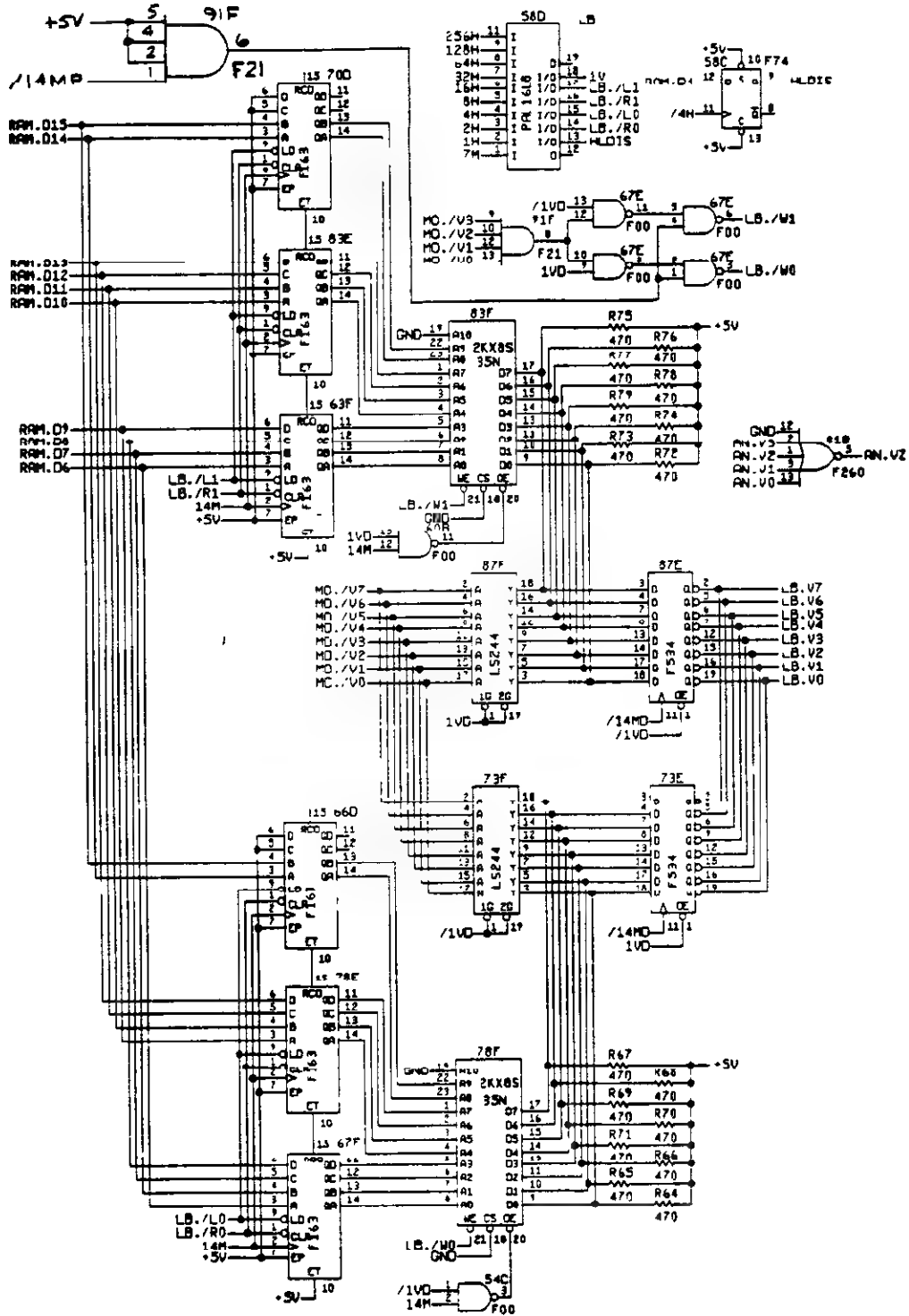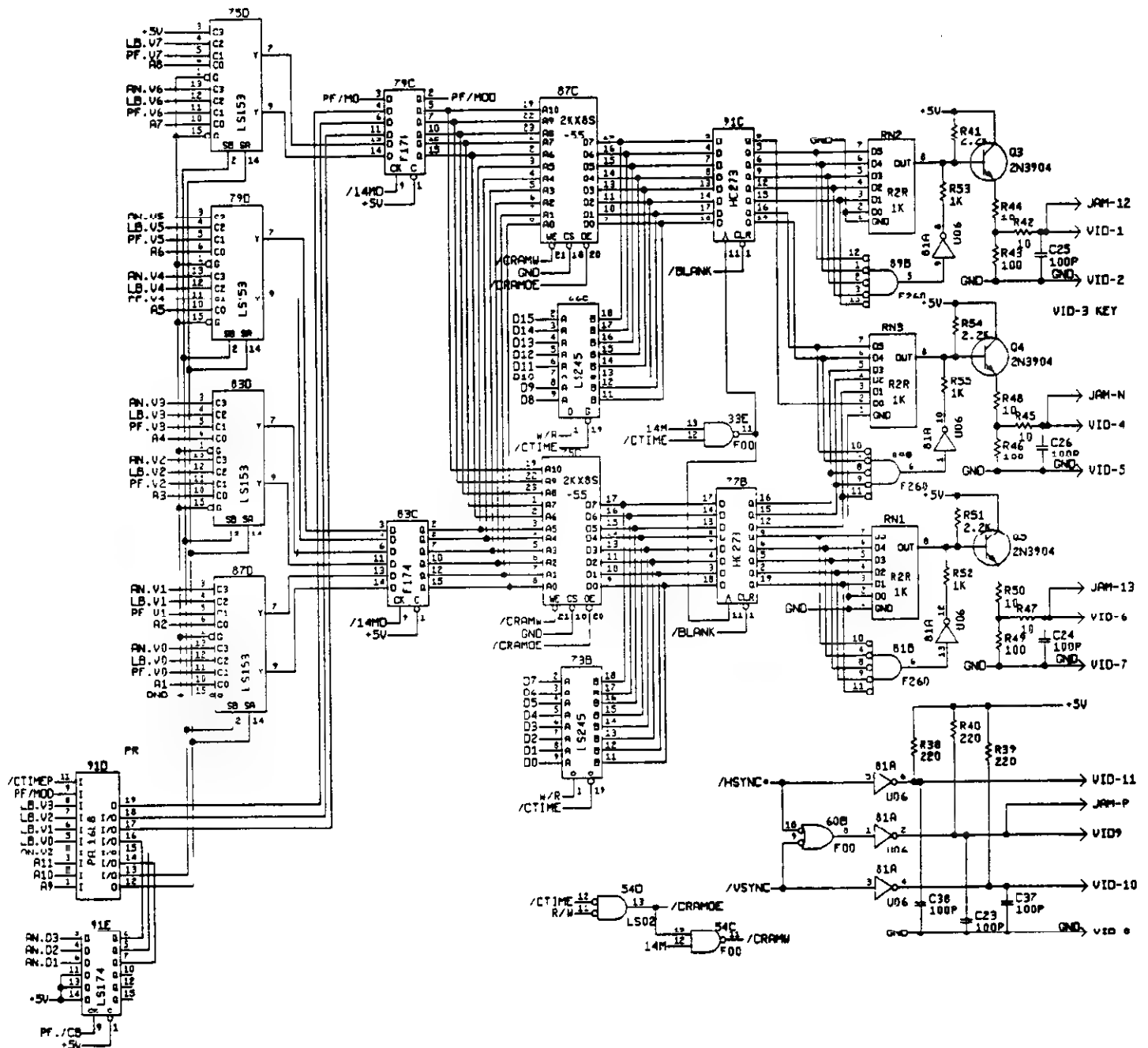
**Figure 5-1 Cyberball 2072 PCB Assembly Schematic Diagram,
Sheet 6 of 7**

047067-01 C

Figure 5-1 Cyberball 2072 PCB Assembly Schematic Diagram,
Sheet 7 of 7

047067-01 C
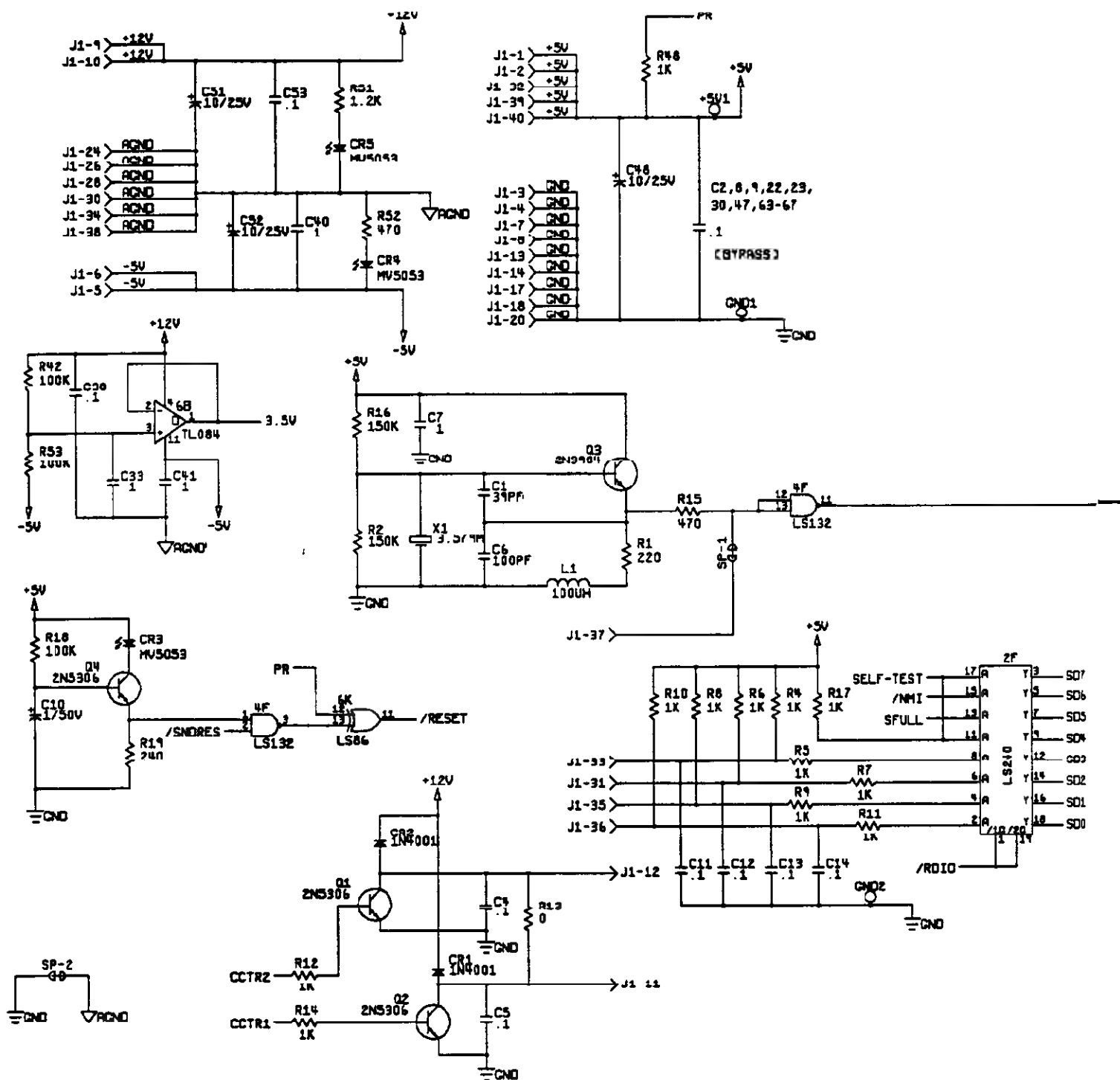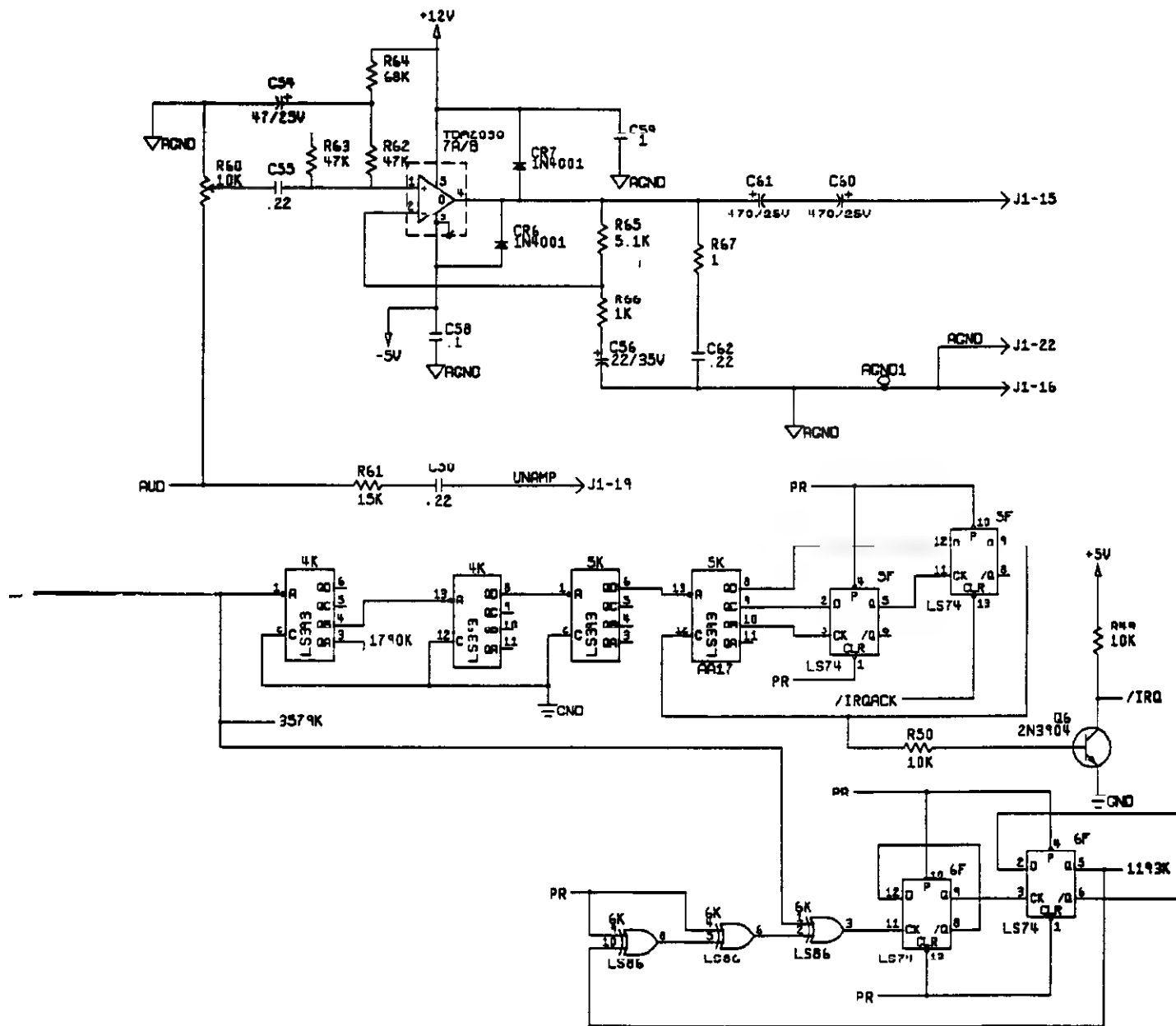
Figure 5-2 JSA II Audio PCB Assembly Schematic Diagram.
Sheet 1 of 3

046487-01 D

2D

SA15	/ROM
SA14	/YAM
SA13	/REST
SA12	/RAM
SA11	A13B
SA9	A12B
BA13	/SWR
BA12	/SRD
O2	
SR//W	

PAL16L8

3C

SD5	LPF
	YM2
SD3	YM1
SD2	YM0
SD1	EPG
SD0	

LS174

/MIX
/RESET

3F

PR	/MIX
/REST	/WRIO
SA10	/WRP
	/WRV
	/IRQACK
SA9	/RDIO
SA2	/RDP
SA1	/RDV

LS138

4O

SD7	BA13
SD6	BA12
SD5	CCTR2
SD4	CCTR1
SD3	VFREQ
SD2	/OKIRES
SD0	/YAMRES

LS273

/WRIO
/RESET

7K

VA15	1	A15	
VA14	27	A14	O7 VD7
VA13	26	A13	O6 VD6
VA12	2	A12	O5 VD5
VA11	23	A11	O4 VD4
VA10	21	A10	O3 VD3
VA9	24	A9	O2 VD2
VA8	22	A8	O1 VD1
VA7	3	A7	O0 VD0
VA6	4	A6	
VA5	5	A5	
VA4	6	A4	
VA3	7	A3	
VA2	8	A2	
VA1	9	A1	
VA0	10	A0	

U27512

**Figure 5 2 JSA II Audio PCB Assembly Schematic Diagram,
Sheet 2 of 3**

046487-01 D

+12V

C49 .001
C42 .0068
R57 10K
R56 20K
C35 .1
RGND

R54 6.8K
R58 6.8K
6C
TL084
R44 10K
6C
TL084
R43 2K

13 6C
TL084
DA0
C46 3300PF
C44 3300PF
R55 3.3K
R57 16K
C45 .015
RGND

C28 .0068
RGND
C34 .1
RGND
C27 .1
-5V

+5V

C16 .1
GND

R20 10K

3D
VCC
SD7 15 D7
SD6 14 D6
SD5 13 D5
CD4 12 D4
SD3 3 D3
SD2 2 D2
SD1 1 D1
SD0 20 D0
8 S/M-
PR 7 RESREQ
6 EFULL
/WRP 9 WR
/RDP 10 RD
CK GND
11 18

RES 16 /SNORES
FULL 4 /NMI
BUSY 5 SFULL
SD 19

SCOM

GND

SELF-TEST
SW1
ON OFF
GND

J1-29

R32 1K
J1-23

C49 .1
C17 100PF

SFULL

R30 470
J1-27

C19 100PF

GND

J1-21
R31 1K

J1-25
R29 470

C18 100PF
C20 100PF
GND

Figure 5 2 JSA II Audio PCB Assembly Schematic Diagram,
Sheet 3 of 3

046487-01 D

Memory Map of
Video Processor

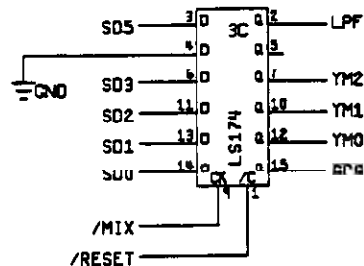| ADDRESS	SIZE	ADDRESS BUS ZZZZ 1111 1111 1100 0000 0000 3210 9876 5432 1098 7654 3210	R/W	DATA BUS 1111 1100 0000 0000 5432 1098 7654 3210	FUNCTION
000000 - 007FFF	16KW	0— —000 0AAA AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	SHORT ABSOLUTE PROGRAM PROM
008000 - 00FFFF	16KW	0— —000 1BBA AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	SLAPSTIC PROGRAM PROM
010000 - 04FFFF	224KW	0 AAA AAAA AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	LONG ABSOLUTE PROGRAM PROM
FC0000		1— —110 000- — — — —	R	DDDD DDDD	SWITCH 1 (PLAYER 1)
				DD	UNUSED
				D	LEFT ACTION
				D	STEP (DEVELOPMENT ONLY)
				DDDD	LEFT PLAYER JOYSTICK (L,R,D,U)
FC2000		1— —110 001- — — — —	R	DDDD DDDD	SWITCH 2 (PLAYER 2)
				DD	UNUSED
				D	LEFT ACTION
				D	UNUSED
				DDDD	LEFT PLAYER JOYSTICK (L,R,D,U)
FC4000		1— —100 010- — — — —	R	DDDD	STATUS
				D	SELF-TEST (ACTIVE LO)
				D	VBLANK
				D	AUDIO BUSY (ACTIVE LO)
				D	UNUSED
FC6000		1— —100 011- — — — —	R	DDDD DDDD	AUDIO READ
FC8000 - FC83FE	512B	1— —100 100- —-AA AAAA AAA0	R/W	DDDD DDDD	EEROM
FCA000 - FCAFFE	2KW	1— —100 101- AAAA AAAA AAA0	R/W	DDDD DDDD DDDD DDDD	COLORAM
FD0000		1— —101 000- — — —	W		EEROM UNLOCK
FD2000		1— —101 001- — — —	W		AUDIO RESET
FD4000		1— —101 010- — — —	W		WATCH DOG
FD6000		1— —101 011- — — —	W		VIDEO IRQ ACKNOWLEDGE
FD8000		1— —101 100- — — —	W	DDDD DDDD	AUDIO WRITE
FF0000 - FF1FFF	4KW	1— —111 000A AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	PLAYFIELD PARAMETER RAM
FF2000 - FF2FFF	2KW	1— —111 0010 AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	ALPHANUMERICS PARAMETER RAM
FF3000 - FF3FFF	2KW	1— —111 0011 AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	MOTION OBJECTS PARAMETER RAM
FF4000 - FFFFFF	24KW	1— —111 AAAA AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	PROGRAM RAM

Figure 5-3 Memory Map

Cyberball 2072™ Statistics Sheet

Statistics Screens

First Statistics Screen	Second Statistics Screen

First Statistics Screen

Left Mechanism Coins _____

Right Mechanism Coins _____

Total Games _____

0 Player Minutes _____

1 Player Minutes _____

2 Player Minutes _____

Error Count _____

Total Credits _____

Average Time per Credit _____

Second Statistics Screen

Percent

Game Breakers _____ _____

Beginner Games _____ _____

Computer Coach Games _____ _____

Game Breakers _____ _____

1 Period Games _____ _____

2 Period Games _____ _____

3 Period Games _____ _____

4 Period Games _____ _____

5 Period Games _____ _____

6 Period Games _____ _____

7-Plus Period Games _____ _____

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If the products described in this manual fail to conform to this warranty, Seller's sole liability shall be, at its option, to repair, replace, or credit Buyer's account for such products which are returned to Seller during said warranty period, provided:

(a) Seller is promptly notified in writing upon discovery by Buyer that said products are defective;

(b) Such products are returned prepaid to Seller's plant; and

(c) Seller's examination of said products discloses to Seller's satisfaction that such alleged defects existed and were not caused by accident, misuse, neglect, alteration, improper repair, installation, or improper testing.

In no event shall Seller be liable for loss of profits, loss of use, incidental or consequential damages.

Except for any express warranty set forth in a written contract between Seller and Buyer which contract supersedes the terms herein, this warranty is expressed in lieu of all other warranties expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose, and of all other obligations or liabilities on the Seller's part, and it neither assumes nor authorizes any other person to assume for the Seller any other liabilities in connection with the sale of products by Seller.

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